5-1976

Auditory or visual perception : which is the better predictor of reading comprehension

Thomas Spencer Chalkley Jr.

AUDITORY OR VISUAL PERCEPTION: WHICH IS THE BETTER PREDICTOR OF READING COMPREHENSION

BY

THOMAS SPENCER CHALKLEY, JR.

A THESIS

SUBMITTED TO THE GRADUATE FACULTY
OF THE UNIVERSITY OF RICHMOND
IN CANDIDACY
FOR THE DEGREE OF
MASTER OF ARTS IN PSYCHOLOGY

MAY 1976

AUDITORY OR VISUAL PERCEPTION:
WHICH IS THE BETTER PREDICTOR OF
READING COMPREHENSION

By Thomas S. Chalkley, Jr.

Approved:

Chairman

William Edwin Walker

Jean N. Dickinson

ACKNOWLEDGEMENTS

This author gratefully acknowledges the continuing advice and criticism by Dr. Edward H. Tiller, Mrs. Jean N. Dickinson, and Dr. William Walker during the period of this study. The author also expresses appreciation to Mrs. M. D. Kerby for her test and constant support throughout this study.

ABSTRACT

All first and third graders from a surburban public school were administered the Kerby Learning Modalities Test (KLMT) and the Metropolitan Achievement Test Battery (MAT). The relationship between the MAT reading comprehension subtest percentile scores, the KLMT overall visual percentile scores, and the KLMT overall auditory percentile scores were explored through the use of Regression Analysis and other correlational techniques. The various correlations were used in several prediction models. There was no significant difference ($p > .01$) between the full model predicting Reading Comprehension (RC) with Auditory (A) and Visual (V) and the restricted model predicting RC with A; however there was significant difference ($p < .01$) between the full model and the restricted model predicting RC with V. These results demonstrated that there was a high positive relationship between MAT-RC percentile scores and KLMT-A percentile scores; while there was no significant relationship between MAT-RC percentile scores and KLMT-V percentile scores.

TABLE OF CONTENTS

INTRODUCTION

A large number of children entering school each year have learning disabilities which hinder their academic progress. Oakland and Williams (1971) found that these disabilities frequently were related to insufficient sensory and perceptual development. They stated that it was increasingly evident that more and more children needed systematized training in attention, memory skills and discrimination. Further, they felt that these disabilities affected the children's reading ability.

Reading has been one of the fundamental skills involved in the elementary learning process. Children have been expected to absorb knowledge as it appeared in written form. Assumptions were made that if a child could respond orally to questions, he could also comprehend related written material. Thus, any child who was unable to comprehend what he read was at a tremendous disadvantage academically. Harris and Sipary (1971) pointed out that "Comprehension in reading is closely related to the ability to understand spoken language because both involve the understanding of concepts and sentence patterns, regardless of whether they are represented by printed or spoken symbols." (p. 7) From this perspective, reading comprehension is one of the critical

skills involved in the learning process. What does reading comprehension entail? What factors affect the ability to comprehend what one can read? How can reading comprehension be improved? All of these are questions which educators and psychologists alike have posed.

Before the area of reading comprehension can be researched adequately, one must decide what is meant by "reading comprehension." Several definitions of the term have been employed. Hammill and Bartel (1975) stated that reading comprehension is "the ability to attach meanings to words, phrases, sentences, and larger selections." (p. 15) Harris and Sipary (1971) felt that "reading is the meaningful interpretation of printed or written verbal symbols." (p. 13)

Harris (1970) pointed out that reading is accurate when the reader perceives the words as the author wrote them and the meaning he achieves corresponds closely to what the author intended. He stated that comprehension of what one reads is closely related, in the nature of the task, to comprehension of what one hears. He felt that before one can understand, he must have sufficient mastery of the language to meet ordinary conversational needs. Harris concluded that the heart of the reading task is obtaining appropriate meanings from the printed page.

Washburne (1972) stated that the word comprehension, in relation to reading, is used as an "umbrella" term to cover several classes or responses that take place in reading. She stated that Kaluger and Kolson's (1969) list of responses included all of the responses which comprised reading comprehension.

This listing includes:

"1. Ability to locate answers
2. Ability to follow a sequence
3. Ability to grasp main ideas
4. Ability to note details
5. Ability to determine organization
6. Ability to follow directions
7. Ability to read critically
8. Ability to organize and summarize." (pp. 371-372)

Defining reading comprehension and determining the variables that affect reading comprehension are two distinctly different tasks. In order to understand more clearly what is involved in reading comprehension, researchers (Balmuth, 1969; Blanton, 1971; Dornbush and Basow, 1970; DuBois, 1973; Evans, 1969; Ringler and Smith, 1973; Robinson, 1972; Rosner and Simon, 1971; Waugh, 1973; Wolpert, 1971) have studied the relationship between visual and/or auditory perception and reading comprehension.

Many schools have considered one of these factors, visual perception, as an important factor in reading achievement. As Lloyd Dunn (1968) indicated, visual perception training has received wide attention, pioneered largely by Marianne Frostig. Hammill (1972) stated that

> Most, if not all, visual motor programs are based on the concept which assumes that visual perception is an important factor, if not the most important factor, in the learning process. Justification for such a belief ultimately rests upon a score or more of correlational studies, upon interpretation of developmental theories such as that espoused by Piaget and Inhelder (1967) among others upon the work of Gesell (1940), Gesell et al. (1950), and Ilg and Ames (1965), and upon the advocacy of such contributors to the pedogogical literature as Frostig, Gretman, Kephart and Barsch. (p. 554)

Hammill (1972) reviewed thirteen studies (Barrett, 1965; Bryan, 1964; Buckland & Balow, 1973; Goins, 1958; Golden & Steiner, 1969; Hammill et al., 1971; Harrington & Durrell, 1955; Jacobs, 1968; Jacobs et al., 1968; Olsen, 1966; Panther, 1967; Robinson et al., 1958; Shorr & Svagr, 1966) dealing with the relationship between reading comprehension and visual perception. The thirteen studies, drawn from a group of 43, fit six predetermined criteria established by Hammill. These criteria were: (1) no studies prior to 1955 were chosen, (2) reading comprehension tests were used as opposed to tests of word recall or word recognition ability, (3) the visual perception task involved "interpreting and organizing the physical elements of the stimulus rather than the symbolic aspects of the stimulus" (p. 554), (4) only those studies were selected in which statistical analysis was applied, (5) commonly used I.Q. measures were not used as the perceptual instrument, and (6) only studies which used first or second grade subjects were chosen. If a study did not obtain a correlational coefficient of at least 0.35, Hammill did not consider it to have practical significance for educational programming. Only four studies reported coefficients higher than 0.35. The coefficient which Goins (1958) and Harrington & Durrell (1955) reported were in the range of 0.35 to 0.49. Only Golden and Steiner (1969) and Bryan (1964) reported coefficients greater than 0.50. Hammill (1972) concluded that

the correlational research available to him did not support the hypothesis that visual perception ability and reading comprehension were related to any practical or meaningful extent in early primary grade children. However, in spite of Hammill's findings, schools have continued to spend program money on visual perception programs in an effort to improve reading comprehension ability.

The relationship between auditory perception and reading comprehension has been looked at less frequently than the relationship between visual perception and reading comprehension. MacGinitie (1967) stated that "auditory perception is one of the factors in beginning reading that has yet received too little programatic detailed study by educational researchers and too little systematic consideration from teachers." (p. 87)

Various theories have been developed which explain the relationship between reading and particular auditory skills. Such skills as sound blending, memory and discrimination were considered requirements for the mastery of reading. Theorists also assumed that deficiencies in these skills could actually cause reading failure. Such assumptions were drawn primarily from case studies and research by representatives of the educational community (Durrell and Murphy, 1963; Sanstedt, 1964; Weiner, 1966; Wepman, 1960).

Hammill and Larsen (1974), who reviewed thirty-three correlational studies which dealt with the relationship of reading measures and measures of auditory perception, found

no practical relationship between reading and auditory skills. Judgments were made as to the practicality of a relationship by determining whether the median correlation on a particular list of correlations was greater or less than 0.35. They stated that coefficients lower than 0.35 had no significant predictive ability, therefore showed no practical relationship.

However, Hammill and Larsen's (1974) conclusions were contaminated by several factors. Sixty-six percent of the correlations they reviewed were based on author-designed or infrequently used tests. This allowed for very little control over the quality of the tests used for measuring auditory perception. Additionally, no attempt was made to eliminate those correlations derived from tests which did not provide an overall measure of auditory perception. Hammill and Larsen stated that the Digit Span Subtest from the Wechsler Intelligence Scale for Children (WISC), the Auditory Sequential Memory Subtest from the Illinois Test of Psycholinguistic Abilities (ITPA), and the Seashore Measures of Musical Talents tests were the most frequently used measures of auditory perception among the other 34 percent of the correlations. Since these tests measure only a few isolated auditory skills, they cannot be used to measure overall auditory perception.

On the other hand, Rosner (1973) found significant positive correlations between auditory perception scores on the Auditory Analysis Test (AAT) and the language arts

subtests of the Stanford Achievement Tests (SAT). Data from other studies (Bannatyne, 1971; Dornbush & Basow, 1970; Evans, 1969; Myklebust & Johnson, 1962; Wolpert, 1971; Zigmond, 1968) also indicated that there is a positive relationship between reading and auditory perception ability. After Bannatyne (1971) studied all phases of the reading process extensively, he came to the conclusion that an individual who does not have an adequate auditory language (acquired through adequate auditory acuity and auditory perception) will be unable to comprehend what he reads. Carroll (1964) stated that "written language (which is in effect what we are trying to comprehend in reading) must always be regarded as spoken language 'written down' in a particular conventionalized writing system and phrased, often, in a special written style." (p. 62)

Due to Rosner's (1973) findings and the criticisms of Hammill and Larsen (1974) previously mentioned, this researcher believes that those children who score high on a test of auditory perception will also score high on a test of reading comprehension. Additionally, this author agrees with Hammill (1972) that, based on the literature reviewed, visual perception is not related to reading comprehension.

Statement of the Problem

The purpose of this study was to determine whether auditory perception correlates more highly with reading comprehension than does visual perception.

Hypothesis and Predictions

If scores on tests of auditory perception, visual perception, and reading comprehension are assigned percentile ranks, then children who have a highly ranked auditory perceptual ability will also have a highly ranked comprehension in reading. This high ranking in reading comprehension will occur regardless of ranking of the child's visual perceptual abilities.

Based on this hypothesis, the following predictions were made:

1. A high positive correlation would be found between auditory perception and reading comprehension.
2. No significant correlation would be found between visual perception and reading comprehension.

METHOD

Definition of Terms

1. Auditory Perception - Hammill and Bartel (1975) define auditory perceptual processes as those brain operations that involve interpreting and organizing the physical elements of the auditory stimulus rather than the symbolic aspects of the auditory stimulus.

   Operationally, for the purposes of this study, auditory perception will be the overall auditory percentile score on the Kerby Learning Modalities Test (KLMT)

2. Visual Perception - Hammill and Bartel (1975) define visual perceptual processes as those brain operations that involve interpreting and organizing the physical elements of the visual stimulus rather than the symbolic aspects of the visual stimulus.

   Operationally, for the purposes of this study, visual perception will be the overall visual percentile score on the KLMT.

3. Reading Comprehension - This study will base its definition of reading comprehension on Kaluger and Kolson's (1969) list of responses. As previously noted, this listing includes:

   "1. Ability to locate answers
   2. Ability to follow a sequence
   3. Ability to grasp main ideas
   4. Ability to note details
   5. Ability to determine organization
   6. Ability to follow directions
   7. Ability to read critically
   8. Ability to organize and summarize." (pp. 371-372)

   Operationally, for the purposes of this study, reading comprehension will be the percentile score on the reading comprehension subtest on the Metropolitan Achievement Test (MAT).

Subjects

All first and third graders from Watkins Elementary School were available for testing. Watkins is a surburban public elementary school in Chesterfield County, Virginia. The only two criteria for selection were enrollment in either the first or third grades and availability for both tests. The total enrollment for the first and third grades was 213, however only 186 children took both the MAT and the KLMT. The other 27 children were either sick on one of the testing days or out of school for disciplinary action unrelated to the testing situation.

Materials

The Kerby Learning Modalities Test (KLMT) was used to measure the strengths of each individual's visual and auditory perceptual abilities. The KLMT Primary Level was used to measure the auditory and visual abilities of the first grade children. The KLMT Intermediate Level was used for the same purpose with the third graders. The Metropolitan Achievement Tests (MAT) was used to measure each first and third grader's individual reading comprehension ability.

The KLMT is a classroom administered group test used for several purposes. One of its objectives is to identify the strengths of a child's auditory and/or visual channels of communication. One can refer to page 27 of the KLMT Primary Level manual to learn of the other objectives (Appendix I).

The KLMT Primary Level (Appendix III) has a nine month test-retest reliability of 0.81. This is based on the population at Watkins Elementary School. Using the same population, its concurrent validity is 0.80. This is based on comparison of judgments made about the child's strengths and weaknesses from the KLMT Profile and similar judgments made by clinical psychologists based on psychological evaluations containing numerous combinations on tests. These tests include the Screening Test for Identifying Children with Specific Language Disabilities (Slingerland), the ITPA, The Frostig Developmental Test of Visual Perception (Frostig), and the Wepman Test of Auditory Discrimination (Wepman).

The nine month test-retest reliability coefficients for the KLMT Intermediate Level (Appendix IV) are reported for both the Auditory total score and the Visual total score. The Auditory coefficient is 0.65, while the Visual coefficient is 0.63. These are based on the population at Watkins Elementary School. The Intermediate Level reports a concurrent validity, based on the same criterion mentioned for the Primary Level, of 0.87.

The MAT is designed to assess and classify student academic achievement according to levels based on national norms. The Primary I Level Form G has measures in Word Knowledge, Word Analysis, Total Reading, and Math. The Reading score is comprehension score while the Word Knowledge is a vocabulary score. Using the KR-20 Formula for determining test reliability, the Primary I has a reliability of

.96 on the Reading Score. Corrected by the Spearman-Brown Formula, the Primary I has a split-half (odd-even) reliability of 0.95 on the Reading Score. The Third Grade Level Form G has measures in Word Knowledge, Reading, Total Reading, Language, Math Concepts, Math Computation, Math Problem Solving, and Total Math. Again, using the KR-20 Formula, the Reading test has a reliability of .93. Corrected by the Spearman-Brown Formula, the Reading test has a split-half (odd-even) reliability of 0.92.

The validity of the MAT is based on the careful content planning, item writing, item pretesting, and item selecting of each test. Although this is simple face validity, test administrators are advised to review the content and determine whether it matches the content they believe their students should be learning. The Reading Comprehension Subtests appear to be asking the types of questions which Kaluger and Kolson (1969) called comprehension questions. Some examples of these questions are as follows:

"Mother said, 'Look, Jane'!
See the cake I baked.
The cake is for Billy.
Today is his birthday."

22 The best name for this story is -
A Birthday Cake
Mother's Day (grasp main idea)
Jane's Birthday

23 Mother made -
gingerbread
a yellow cake (read critically)
a birthday cake

24 Who had a birthday?
Mother
Billy (read critically)
Jane" (MAT, Primary, Form G, p. 9)

"Joe has a brown and white puppy named Checkers. Checkers sometimes tears things with his sharp, little teeth. One day, he tore Mother's dress. Mother was angry, so she told Joe to take Checkers outdoors. Joe ran to get his coat. Then he and Checkers went down the street to the park. Checkers ran and played in the park until he was tired, and when he came home he went right to sleep.

17 This story is mostly about -
the park
Checkers and his family
life in the city (grasp main idea)
Joe

18 Checkers tore -
some paper
a slipper (locate answers,
Joe's coat note details)
Mother's dress

19 Checkers is probably -
thin
old
lively (read critically)
big

20 In this story the word park means -
leave a car in the street
to rest for a while
stop and wait (read critically)
a place with grass and trees

21 Before he took Checkers outdoors, Joe -
tore a dress
scolded Checkers
got a coat (follow a sequence)
went to sleep

22 You can guess that the weather was -
very hot
rainy
humid (read critically)
cool

23 Checkers probably tears things because -
he is mean
it's his way of playing
he is unhappy (organize & summarize)
he is tired" (MAT, Elementary Form G, p. 5)

If further examples are desired, one can refer to the appropriate form of the MAT.

Procedure

The first and third graders were administered both the KLMT and the MAT as could be conveniently scheduled over a period of three days. The first grade teachers divided their class in half so that there were eight groups of approximately twelve children each. These eight groups were administered both the KLMT and the MAT on Tuesday and Wednesday of one week in May. No attempt was made to control the order of presentation of these tests. The third graders were grouped by homerooms, which resulted in four groups of approximately twenty-five each. The MAT was administered by this researcher and the test designer. Both this researcher and the test designer were familiar people to the students as both had been employed in that school and worked with the children before. The test administrators followed the recommended procedures as in their respective manuals.

RESULTS

The Pearson Product Moment Correlations between Reading Comprehension (RC) and Auditory Perception (A), RC and Visual Perception (V), and A and V were computed. The correlation between RC and V is 0.34; between RC and A is 0.52; and between V and A is 0.47.

The partial correlations were computed to determine the effect of intercorrelation on the various Pearson Product Moment correlations. The correlation between RC and V with A removed ($r_{RC\ V \cdot A}$) is 0.13; between RC and A with V removed ($r_{RC\ A \cdot V}$) is 0.43; and between A and V with RC removed ($r_{A\ V \cdot RC}$) is 0.37.

The multiple correlation coefficient for predicting RC with A and V ($A + V \rightarrow RC$) was then computed. The multiple R was 0.53 which is significant at $p > 0.01$.

In order to test if this was an efficient model for predicting RC, two restricted models were tested against it using an F test. There was a significant difference ($p > 0.01$) between the full model ($A + V \rightarrow RC$) and the restricted model ($V \rightarrow RC$) with an $F\ (1,183) = 42.38$. There was no significant difference between the full model ($A + V \rightarrow RC$) and the restricted model ($A \rightarrow RC$).

DISCUSSION

The Pearson Product Moment Correlations showed that there is a relationship between Auditory Perception (A) and Reading Comprehension (RC), a relationship between Visual Perception (V) and Reading Comprehension (RC), and relationship between A and V. In order to better understand the relationship between A and RC, and V and RC, the data was further analyzed by partialing out the common variance of A and V. This computation revealed that much of the relationship observed in the Pearson Product Moment correlation of V and A. When the common variance of V and A is removed from the relationship between V and RC, the correlation coefficient (.13) drops to a non-significant level. When this same variance is held constant in the relationship between A and RC, the correlation remains significant.

This led to the computation of the multiple correlation prediction model of A + V $\rightarrow$ RC with the further testing of two restricted models against the full model. Satz et al. (1974) state that "if two models differ only in that one contains a source of variance that the other does not, then the magnitude of the difference between the two coefficients of determination is reflective of the size or potency of the various components." The coefficient of determination

for the full model was 0.53^2 while the coefficient of determination for the restricted model eliminating the variable V was 0.52^2. The F test showed that there was no significant difference ($p > 0.01$) between these two models. The conclusion was drawn that a model using just A will predict RC as well as one using A and V. This along with the 0.52 correlation between RC and A and the 0.43 partial correlation between RC and A with V removed, demonstrated a high relationship between ranked auditory scores and ranked reading comprehension scores. This confirmed the first prediction made from this author's hypothesis that if scores on tests of auditory perception, visual perception, and reading comprehension are assigned percentile ranks, then children who have a highly ranked auditory perceptual ability will also have a highly ranked comprehension in reading.

The hypothesis further states that this high ranking in reading comprehension will occur regardless of ranking of the child's visual perceptual abilities. A prediction was made based on the second half of this author's hypothesis. In order to confirm or reject this second prediction, a restricted model predicting RC with V was tested against the full model. There is a moderate difference between the coefficients of determination ($0.53^2 - 0.34^2$) as well as a significant difference $F(1,183) = 42.38$ ($p > 0.01$) between two models. This, added to the low partial correlation between RC and V of 0.13, lends strength to the second

prediction made that no significant correlation exists between visual perception and reading comprehension. Based on Hammill's (1972) opinion that no correlation below .35 has practical significance in educational research, no practically significant relationship exists between V and RC.

The significant correlations between auditory skills and reading comprehension would on the surface encourage one to "jump right in" and urge schools to improve their auditory skills programs and language training.

These steps should not be taken however, until carefully constructed research demonstrates that first, auditory skills can be improved, and second that auditory skill improvement increases reading comprehension.

Additionally, the application of all these results are restricted by the fact that the measure of auditory and visual perception (KLMT) used in this study is standardized on a suburban population. Although the percentage breakdown of race and income level of those children included in the standardization sample of the KLMT closely matches national census data, the living arrangements for those same children must be considered predominately suburban. There were no urban and few rural children included in the sample. Extension of these results to the rural and urban populations, with any degree of reliability, will have to await the standardization of the KLMT on similar populations.

This study provided support for the hypothesis that if scores on tests of auditory perception, visual perception, and reading comprehension are assigned percentile ranks, then children who have a highly ranked auditory perceptual ability will also have a highly ranked comprehension in reading. This high ranking in reading comprehension will occur regardless of the ranking of the child's visual perceptual ability. Further research must be done to establish a cause and effect relationship between auditory perception and reading comprehension in order that programs for reading comprehension improvement can be developed according to research findings rather than the best guesses of individual reading teachers or curriculum specialists.

This research could lead one to question not only reading comprehension programs, but total reading programs where a large percentage of a population has specific problems which might interfere with their learning. An example would be whether or not a strongly phonetic reading program should be used in a population with a high percentage of auditory disabilities or children with dialectical differences.

One is still left with the question of what is involved in reading and how can this be translated into appropriate instruction for all children.

REFERENCES

Arkin, H. & Colton, R. R. Tables for Statisticians. (2nd ed.) New York: Barnes and Noble Inc., 1963.

Balmuth, M. Visual and auditory modalities: how important are they? International Reading Association Conference Proceedings, 1969, 13 (pt 2), 165-190.

Bannatyne, A. Language, reading, and learning disabilities. Springfield, Illinois: Charles Thomas, 1971.

Barrett, T. C. The relationship between measures of pre-reading visual discrimination and first-grade reading achievement. Reading Research Quarterly, 1965, 1, 51-76.

Blanton, B. Modalities and reading. Reading Teacher, 1961, 25, 210-212.

Bryan, Q. R. Relative importance of intelligence and visual perception in predicting reading achievement. California Journal of Educational Research, 1964, 15, 44-48. Cited by D. Hammill, Training visual perceptual processes. Journal of Learning Disabilities, 1972, 5, (10), 39-46.

Buckland, P., & Barlow, B. Effects of visual perceptual training on reading achievement. Exceptional Children, 1973, 39, 299-304.

Carroll, J. B. Language and thought. Englewood Cliffs, New Jersey: Prentice Hall, 1964.

Dornbush, R. L., and Basow, S. Relationship between auditory and visual short term memory and reading achievement. Child Development, 1970, 41, 1033-1044.

DuBois, N. F. Selected Correlations between reading achievement and various visual abilities of children in grades two and four. Perceptual and Motor Skills, 1973, 37, (1), 45-46.

Dunn, L. M. Special education for the mentally retarded: is much of it justifiable? Exceptional Children, 1968, 35, (1), 5-22.

Durost, W. N., Bixler, H. H., Wrightstone, J. W., Prescott, G. A., and Balow, I. H. Metropolitan Achievement Tests, New York: Harcourt, Brace, Jovanovich, 1971.

Durrell, D. and Murphy, H. The auditory discrimination factor in reading readiness and reading disabilities. Education, 1963, 73, 556-560.

Evans, J. R. Auditory and auditory-visual integration skills as they relate to reading. Reading Teaches, 1969, 22, 625-629.

Ferguson, G. A. Statistical analysis in psychology and education. (3rd ed.) New York: McGraw-Hill, 1971.

Gesell, A. The first five years of life. New York: Harper and Row, 1940.

Gesell, A., Ilg, F. L., and Bullis, G. E. Vision: its development in infant and child. New York: Hafner, 1950. Cited by D. Hammill, Training visual perceptual processes. Journal of Learning Disabilities, 1972, 5, (10), 39-46.

Goins, J. T. Visual perceptual abilities and early reading progress. Supplement Educational Monograph, Chicago: University of Chicago, 1958. Cited by D. Hammill, Training visual perceptual processes. Journal of Learning Disabilities, 1972, 5, (10), 39-46.

Golden, N. E. and Steiner, S. R. Auditory and visual functions in good and poor readers. Journal of Learning Disabilities, 1969, 2, (9), 476-481.

Gronlund, N. E. Measurement and education in teaching. New York: Macmillan, 1965.

Hammill, D. Training visual perceptual processes. Journal of Learning Disabilities, 1972, 5, 10, 552-559.

Hammill, D. and Bartel, N. R. Teaching children with learning and behavior problems. Rockleigh, New Jersey: Allyn and Bacon, 1975.

Hammill, D., Goodman, L., and Wiederhold, J. L. Use of the Frostig D.T.V.P. with economically disadvantaged children. Journal of School Psychology, 1971, 9, 430-435.

Hammill, D. and Larsen, S. C. The relationship of selected auditory perceptual skills and reading ability. Journal of Learning Disabilities, 1974, 7, (7), 429-435.

Harrington, M. J., and Durrell, D. Mental maturity versus perception abilities in primary reading. Journal of Educational Psychology, 1955, 46, 375-380.

Harris, A. J. How to increase reading ability. (5th ed.) New York: David McKay Co. Inc., 1970.

Harris, A. J. and Sipay, E. R. Effective teaching of reading. New York: David McKay Co. Inc., 1971.

Ilg, F. L. and Ames, L. B. School readiness. New York: Harper & Row, 1965.

Jacobs, J. N. An evaluation of the Frostig visual perception training program. Educational Leadership, 1968, 35, 332-340.

Jacobs, J. N., Wirthlin, L. O., and Miller, C. B. A follow-up evaluation of the Frostig visual perceptual training program. Educational Leadership Research Supplement, 1968, 4, 169-175. Cited by D. Hammill, Training visual perceptual processes. Journal of Learning Disabilities, 1972, 5, (10), 39-46.

Kaluger, G. and Kolson, C. J. Reading and learning disabilities. Columbus, Ohio: Charles Merrill, 1969.

McGinitie, W. H. Evaluating readiness for learning to read: a critical review and evaluation of research. Reading Research Quarterly, 1969, 5, 1, 396-410.

Myklebust, H. R. and Johnson, D. Dyslexia in children. Exceptional Children, 1962, 29, 14-25.

Oakland, T. and Williams, F. Auditory perception: diagnosis and development for language and reading abilities. Seattle, Washington: Special Child Publications, 1971.

Olson, A. Relation of achievement test scores and specific reading abilities to the Frostig D.T.V.P. Perceptual and Motor Skills, 1966, 22, 179-184.

Panther, E. E. Prediction of first grade reading achievement. Elementary School Journal, 1967, 68, 44-48.

Pioget, J. and Inhelder, B. La psychologie de l'enfant. Paris Presses Universitairs de France, 1967. Cited by D. Hammill, Training visual perceptual processes. Journal of Learning Disabilities, 1972, 5, (10), 39-46.

Ringler, L. H. and Smith, I. L. Learning modalities and word recognition of first grade children. Journal of Learning Disabilities, 1973, 6, (6), 307-312.

Robinson, H. M. Visual and auditory modalities related to methods for beginning reading. Reading Research Quarterly, 1972, 8, (3), 7-39.

Robinson, H. M., et al. An evaluation of the children's visual achievement forms at grade one. American Journal of Optometry and Archives American Academy of Optometry, 1958, 35, 515-525. Cited by D. Hammill, Training visual perceptual processes. Journal of Learning Disabilities, 1972, 5, (10), 39-46.

Roscoe, J. T. Fundamental research statistics for the behavioral sciences. New York: Holt, Rinehart, and Winston, 1969.

Rosner, J. Perceptual skills: a concern of the classroom teacher? Reading Teacher, 1971, 24, 543-549.

Rosner, J. Language arts and arithmetic achievement, and specifically related perceptual skills. American Educational Research Journal, 1973, 10, (1), 59-68.

Rosner, J. and Simon, D. R. The auditory analysis test: an initial report. Journal of Learning Disabilities, 1971, 4, (7), 384-392.

Sanstedt, B. Relationship between memory span and intelligence of severely retarded readers. Reading Teacher, 1964, 17, 246-250.

Satg, P., Bakker, D. J., Teunissen, J., Goebel, R., Van der Vlwelt, H. Brain and language. In Press.

Shorr, R. and Svagr, V. Relationship of perceptual and visual skills with reading accuracy and comprehension. Journal of American Optometric Association, 1966, 37, 671-677. Cited by D. Hammill, Training visual perceptual processes. Journal of Learning Disabilities, 1972, 5, (10), 39-46.

Spence, J. T., Underwood, B. J., Duncan, C. P., and Cotton, J. W. Elementary statistics. (2nd ed.) New York: Appleton-Century-Crofts, 1968.

Washburne, C. Comprehension. Elementary English, 1972, 49, 544-551.

Waugh, R. P. Relationship between modality preference and performance. Exceptional Children, 1973, 39, (7), 465-469.

Weiner, J. M. Motivation and memory. Psychological Monograph, 1966, 80, (18, Whole No. 626). Cited by D. Hammill and S. Larsen. The relationship of selected auditory perceptual skills and reading ability. Journal of Learning Disabilities, 1974, 7, (7), 429-435.

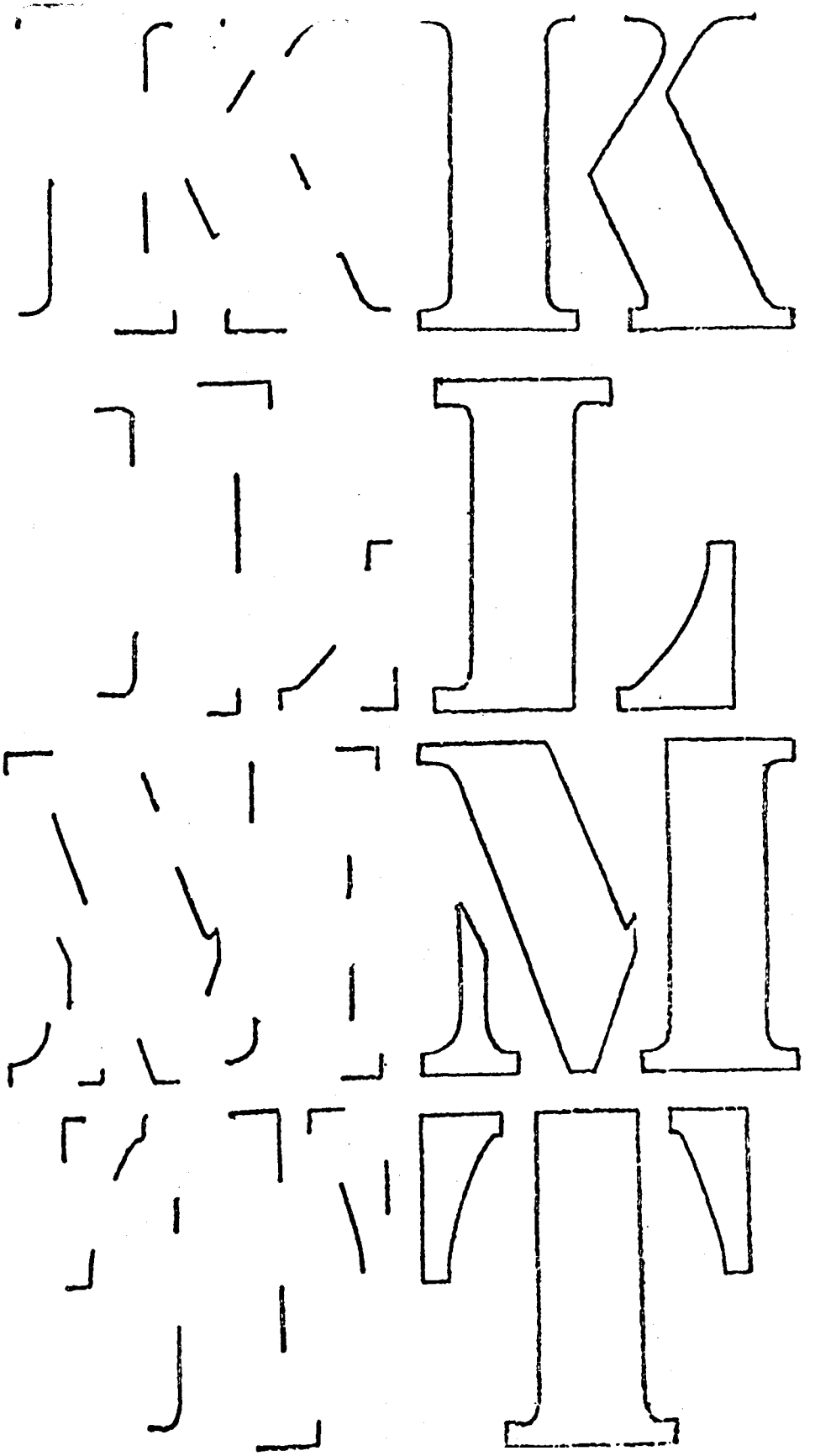
Wepman, J. M. Auditory discrimination, speech, and reading. Elementary School Journal, 1960, 60, 325-333.

Winer, B. J. Statistical principles in experimental design. (2nd ed.) New York: McGraw Hill, 1971.

Wolpert, E. M. Modality and reading: a perspective. Reading Teacher, 1971, 24, (8), 640-643.

Zigmond, N. K. Auditory Learning, San Rafael, California: Dimensions Publishing Co., 1968.

APPENDIX I



THE KERBY LEARNING MODALITY TEST: UPPER LEVEL, PRIMARY AND KINDERGARTEN

AGES 5 THROUGH 12 AND UP

THE KERBY LEARNING MODALITY TEST,

MANUAL FOR ADMINISTRATORS

Maude L. Kerby, M Ed.

Acknowledgments

We wish to express our thanks to a number of people who have made it possible to carry out the research necessary for the development of the Kerby Learning Modality Test.

First thanks must go to A. J. Chenery, Jr., Principal of the J. B. Watkins Elementary School in Chesterfield County, Virginia. But for his help and encouragement, even his insistance, we would have given up before ever reaching this point.

Our friend and typist, Mrs. Opal Keller has for three years made sense out of our chaos, working from scrawled pages, abbreviations and sudden telephone calls.

Mr. D. C. Williams, of Williams Printing, has been always ready to stop everything and print thousands of pages or only a few hundred depending on the need of the moment and always at no financial gain.

The teachers and staff at Watkins Elementary have been more than humanly tolerant of our needs, destroying their class schedules at a moment's notice to permit the administration of the KLMT.

Finally, it must be admitted that the author's husband has helped, running calculations, running errands, running the test on his college classes, and not running away from the whole thing.

Our gratitude goes to all these and many more for their help and patience.

Maude L. Kerby, M Ed.

Midlothian, Virginia 23113
1974

The Kerby Learning Modality Test

Instruction Manual

Maude L. Kerby

The Kerby Learning Modality Test (KLMT) is available in three forms; Kindergarten, Primary and Upper levels. This manual describes the Upper level KLMT, presenting the rationale, history, validation and application of this test instrument.

The KLMT is a group screening instrument for the identification of children with perceptual learning disabilities. The instrument also identifies perceptual strengths in children who do not have disabilities. Screening with the KLMT may permit the grouping of children for remedial and instructional purposes by their perceptual needs.

Children with perceptual learning disabilities are those children with normal or above normal mental ability, adequate vision, hearing and musculo-skeletal development and no physical disabilities which affect the learning processes, but are markedly under-achieving because of deficits in their visual, auditory or kinesthetic (motor) perceptual modalities.

The KLMT is based on the premise that there are three fundamental channels for learning. Visual, auditory, and motor. (Cooper in Harris, 1972, p. 121; Myklebust, 1968, p. 13) These modalities operate through the sight, hearing and kinesthetic systems. These perceptual modalities are relatively discrete and measurable as demonstrated by various published tests (Frostig, 1963; Wepman, 1958; Slingerland, 1962) and by studies reported by such workers as Myklebust (1968, p. 13).

History

Experimental work with the KLMT has spanned several years. The first version of the instrument, then called only 'the test', was administered by classroom teachers to all children in grades three through six at the J. B. Watkins Elementary School in Chesterfield County, Virginia during February, 1971.

The results of this trial were tabulated against cultural background, race, sex, diagnostic data from the county's diagnostic clinic where this was available, standardized IQ scores and classroom scholastic achievement. It was found that children who scored below the twenty seventh percentile (Crocker, 1971) in a perceptual modality matched in scholastic achievement and clinic diagnosis the pattern definitive of learning disability. Statistically the correlation between the KLMT results and these initial criteria (clinic and achievement) was sufficiently high that the KLMT appeared to be basically sound in design. The ensuing year was devoted to efforts at obtaining a larger population sample and to refining the instrument. The larger sample was unobtainable but successful modification of the instrument, principally a matter of item modification based on analysis and adoption of standardized scoring templates and formal test structure was done.

In February, 1972 the revised KLMT was re-administered at Watkins Elementary School. Selected sub-tests were further revised and re-administered. The results were analyzed as before and were found to be consistent with the initial trial. Correlation with the same criteria used before were high. At this point it appeared that the KLMT was a functional instrument. It seemed to be diagnostic, it required only about 45 minutes for administration to classroom groups and it could be administered and scored by the classroom teacher or aide. These qualities made the KLMT seem valuable.

Through the cooperation of the administration of the Richmond, Virginia public schools the KLMT was administered to the upper elementary students in Stonewall

Jackson and Grace Arents schools in October, 1972. At the time these were the schools designated for children with learning problems. While diagnostic data were not available for all these children, they had been tested with the Slingerland (Slingerland, 1962) and the Frostig (Frostig, 1963) tests and the Valett check lists (Valett, 1968).

The KLMT identified 93% of the tested children as having perceptual learning disabilities.

At this time further alterations of various sub-tests were tried in the fifth grade at Watkins Elementary School in a continuing program of test refinement. Nonsense words were substituted in the Auditory Discrimination and Closure sub-tests. It was felt that nonsense words might reduce any bias for educational experience. The entire auditory portion of the KLMT was recorded on tape to ensure standardized presentation.

Because of the possibilities in a test of this kind it was urged that a version for use in the primary grades be developed. In November, 1972 a Primary KLMT was administered to the first three grades at Watkins Elementary School. This version consisted of essentially the same sub-tests and items as the version on which the previous work was done. All items were simplified and test responses were recorded directly in the test booklet rather than on separate answer sheets. Again the results agreed in all respects with earlier trials.

In order to determine whether the results obtained with the KLMT would be applicable to an inner city school population the Primary KLMT was administered to the children at Fairfield Elementary School in Richmond, Virginia. The Fairfield population consisted of 90% black students from the local residential area and 10% white students brought in by bus from other areas of the city.

The results of this trial indicated that the KLMT could be used in inner city schools but that norms based on a much broader population sample than that available

at the time were needed.

While the initial purpose of the KLMT was identification of children with specific learning disabilities it was found in the course of the studies that children repeatedly showed patterns of perceptual modality preference. In order to define modality preference a difference of 10 percentile points between the visual and auditory modality scores on the KLMT was designated as indication of a modality preference. A child with less than 10 points difference was designated as showing no preference. It was felt that knowledge of a child's modality preference could be of value in designating instruction groups according to perceptual strengths.

In March, 1973 a Kindergarten version of the KLMT was designed and administered to approximately 75 students in the Watkins Elementary kindergarten classes. The test results were compared with teachers' diagnosis and it was found that KLMT diagnosis of disability coincided with the teachers' observations in 92% of the cases.

In May, 1973 this same kindergarten group was given the Slingerland Screening Tests (Slingerland, 1962) in slightly modified form by one of the school psychologists. Comparison of KLMT results with this test gave correlations of .99 in the visual sub-tests, .99 in the auditory sub-tests and .98 in the motor sub-tests using the Spearman rank-order correlation coefficient.

To determine this correlation the Slingerland scores were converted to percentiles by standard grouping methods. These percentiles were used for rank ordering and the KLMT percentile rank order of the individual was compared using the Spearman formula (Crocker, 1971).

At this time it was felt that the KLMT was a finished instrument. Work since this time has been directed toward the collection of validation and reliability data, which will be presented later.

Description of Upper KLMT

The KLMT is an instrument designed for classroom administration by the classroom teacher and requires about 45 minutes administration time. It consists primarily of exaggerated work sample items with very brief time segments. (Siegel, 1969, p. 51-52)

The KLMT sub-tests are as follows:

I. Visual

A. Discrimination - students compare pairs of number and letter groups and mark S or D for same or different.

B. Memory - students study designs then turn to larger collection of designs and mark S or D as determined by whether designs had been studied in previous group or not.

C. Closure - students write letters or numbers he perceives in list of broken letters and numbers.

D. Motor - students copy list of nonsense words and numbers.

II. Auditory (on tape)

A. Discrimination

1. Students mark S or D determined by whether pairs of nonsense words rhyme or not.
2. Students mark S or D determined by whether pairs of nonsense words have same or different first vowel sounds.

B. Memory - students write + or - and letter or digit added or left out of second member of pairs of letter and number groups.

C. Closure

1. Students mark S or D determined by whether broken nonsense word and blended word are the same or different.
2. Students mark S or D determined by whether imcomplete and complete nonsense words are the same or whether original has been changed instead of completed.

D. Motor - students write letters and digits from dictation.

III. Motor is a combination of the visual motor and auditory motor sub-test scores.

Standardization of Upper KLMT

Standardization of the Upper Level KLMT was carried out on the student population of J. B. Watkins Elementary School, Chesterfield County, Virginia. There were approximately 100 children in each grade level (82-112). The following table presents the test population beside the latest available national distribution as tabulated by the U. S. Bureau of the Census (World Almanac, 1971).

		Watkins %	National %
Sex:	Male	46	49
	Female	54	51
Race:	White	91	89
	Black	8	10
	Other	1	1
Economic:	Upper	25	25
	Middle	67	60
	Lower	8	15
Geographic:	Rural	0	49
	Suburban	100	21
	Urban	0	30

As may be seen the test population agrees well with the national in all respects except the geographic. The test sample contains no children from a true rural nor a true urban or inner city background. This does not seem to invalidate the results but before testing inner city or rural population the norms should be extended to include representative of these two groups.

The Upper Level KLMT was administered by a trained non-professional to grade level groups during the fall of 1973.

The norm tables which follow were derived from this testing.

Norm Tables for Upper KLMT

These norms are standardized by chronological ages in one year segments. These norms reflect more accurately the perceptual abilities of the tested children than do

norms based on grade level groups. Norms were calculated by the standard method of grouping to find the frequency distribution. From the calculated percentile chart graphic presentation of the data was made for visual determination of the curve. All curves are good approximations of the standard ogive of frequency distributions.

8.1 - 9.0 Years

Score	Visual Percentile					Auditory Percentile					Motor
	Disc.	Mem.	Clos.	Motor	Total	Disc.	Mem.	Clos.	Motor	Total	Total
0	3	5	0		2		0		6	2	3
1	7	10	2	0	5		1		8	2	5
2	14	15	5	1	9		2		11	3	6
3	30	22	15	9	19		3		17	5	16
4	50	29	35	37	38		7	0	23	8	33
5	74	38	59	64	59		15	1	37	14	52
6	86	47	73	84	73	0	27	2	39	17	63
7	89	55	86	93	82	1	40	3	50	22	72
8	92	62	92	95	86	4	60	5	60	31	78
9	94	68	95	97	89	10	81	6	71	41	85
10	97	75	97	98	92	17	87	12	78	48	88
11	98	82	98	98	95	27	89	23	85	55	92
12	98	86	99	99	96	36	93	32	89	61	94
13	98	89	99	99	97	54	95	55	92	74	96
14	99	92	100	100	97	71	96	71	94	83	97
15	99	94			98	87	99	84	96	92	98
16	99	97			99	95	99	93	97	96	98
17	100	98			99	98	99	97	99	98	99
18		99			99	100	100	99	100	100	100
19		100			100			100			
20											
M	10.6	13.5	9.4	10.4	12.0	15.0	12.7	15.6	12.0	13.3	11.7
SD	1.9	2.0	1.6	1.7	-.0	1.4	1.6	1 5	1.9	1.6	1.9

9.1 - 10.0 Years

Score	Visual Percentile					Auditory Percentile					Motor
	Disc.	Mem.	Clos.	Motor	Total	Disc.	Mem.	Clos.	Motor	Total	Total
0	2			0	0				3	1	2
1	3	0		1	1		0		4	1	3
2	5	2	0	2	2		1		6	2	4
3	10	4	2	3	4	0	2		7	2	5
4	16	6	11	6	10	1	3		9	3	7
5	33	9	23	20	23	1	5		12	4	15
6	54	14	34	43	37	2	8		15	6	31
7	69	20	48	66	51	3	14	0	20	10	45
8	82	23	66	79	63	3	25	2	25	14	53
9	92	36	81	90	76	4	35	7	31	21	64
10	95	45	91	95	83	7	46	13	38	27	67
11	97	52	96	98	86	16	56	21	50	35	74
12	98	59	100	100	89	26	65	33	59	45	79
13	100	65			91	36	71	52	69	54	83
14		72			93	46	78	69	76	65	88
15		79			95	56	84	84	82	76	91
16		85			96	68	91	93	86	84	92
17		89			97	80	95	96	91	90	95
18		91			98	93	98	98	95	96	97
19		97			99	97	99	99	97	98	99
20		100			100	100	100	100	100	100	100
M	9 3	14.5	9 3	9.2	13.5	16.6	14.4	16.3	14.5	15.4	13.
SD	1.5	1.6	1 9	1 4	2.0	1.5	1.6	1.5	1.9	1 7	1.

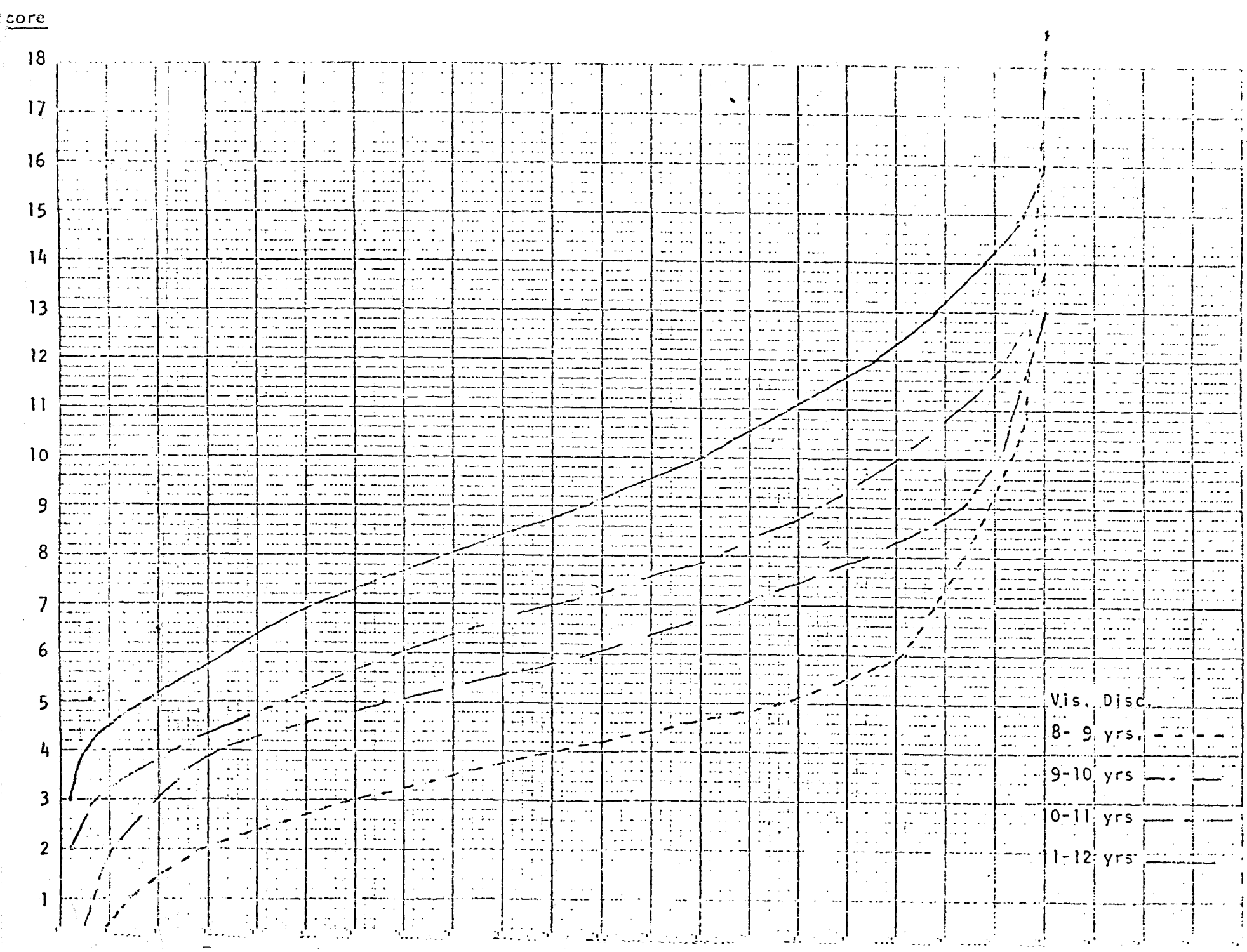
10.1 - 11.0 Years

Score	Visual Percentile					Auditory Percentile					Motor
	Disc.	Mem.	Clos.	Motor	Total	Disc.	Mem.	Clos.	Motor	Total	Total
0	0	0	0								
1	0	0	1		0				0		0
2	1	0	3	0	1		0		1	0	1
3	4	1	5	2	4		1		2	4	4
4	11	5	10	5	9		2		3	7	9
5	23	8	15	12	16		4		5	8	16
6	34	12	29	23	24	0	7	0	8	10	24
7	50	15	36	37	36	1	10	1	10	15	36
8	67	19	55	59	47	2	15	2	13	20	47
9	77	25	71	78	62	4	22	5	20	25	62
10	85	34	85	93	68	7	30	8	29	33	68
11	91	42	93	97	74	10	40	17	37	43	74
12	96	54	98	100	76	19	48	32	45	51	76
13	98	57	100		83	29	56	47	54	63	83
14	100	63			88	44	65	63	65	75	88
15		69			90	52	73	82	75	84	90
16		77			95	66	82	92	82	91	95
17		84			98	79	89	97	89	97	98
18		92			100	92	95	100	96	99	100
19		98				98	97		100	100	
20		100				100	100				
M	10.4	15.1	10.0	9.6	12.3	16.8	16.8	15.3	14.2	14.5	12.
SD	1.5	2.3	1.4	1.3	1.3	1.5	1.7	1.4	1.7	1.8	1

11.1 - 12.0 Years

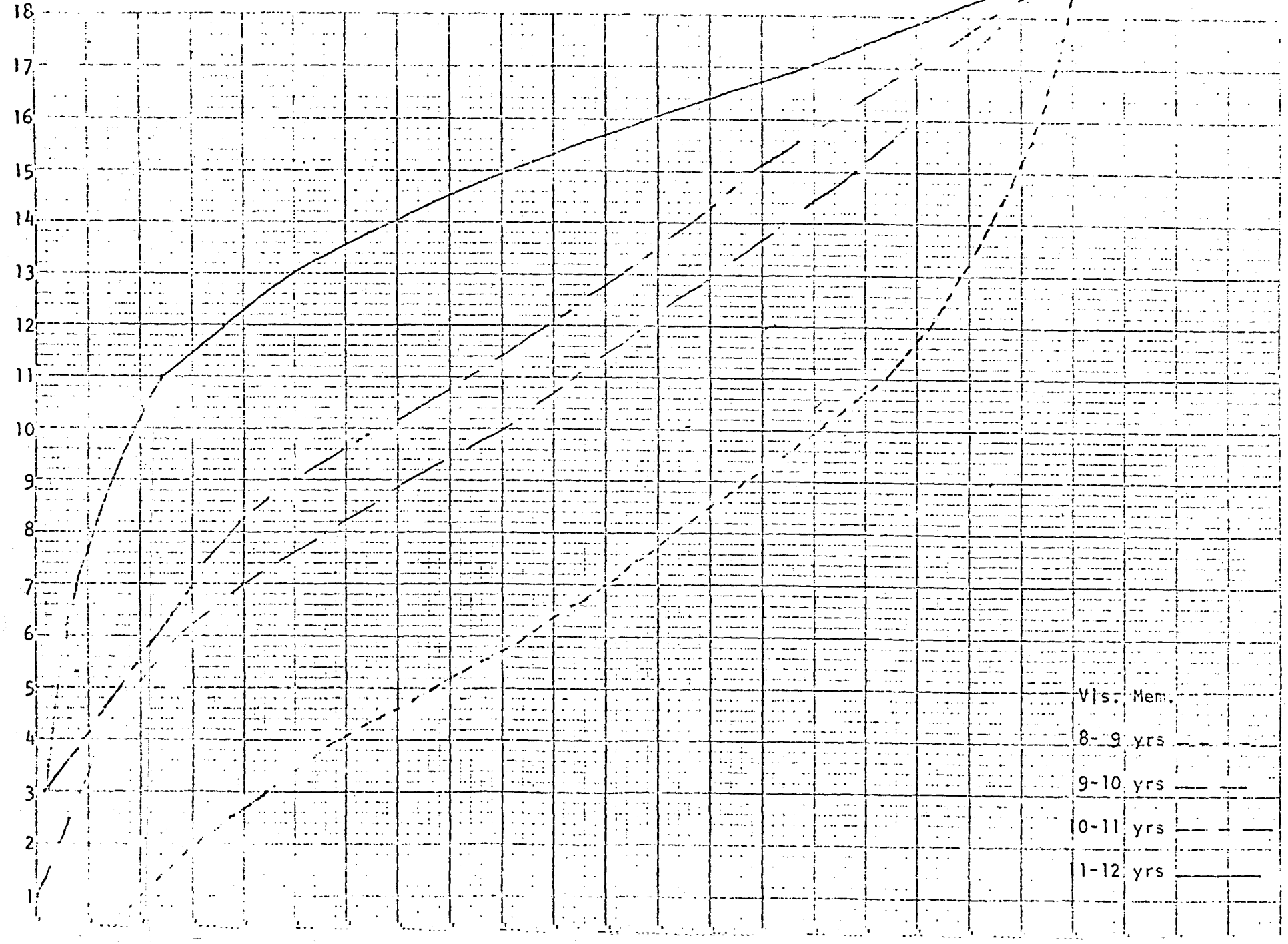
Score	Visual Percentile					Auditory Percentile					Motor
	Disc.	Mem.	Clos.	Motor	Total	Disc.	Mem.	Clos.	Motor	Total	Total
0				0							
1				1	0				0	0	0
2	0	0	0	1	0				1	0	1
3	1	1	1	2	1		0		1	0	1
4	3	1	2	2	2		1	0	2	1	2
5	9	2	4	3	5		1	1	3	2	3
6	17	3	9	8	10		2	2	5	3	7
7	26	4	15	17	16	0	3	2	6	4	12
8	40	6	22	29	24	1	4	3	7	5	16
9	53	7	34	37	34	2	8	5	9	7	23
10	65	9	50	55	45	3	14	8	11	11	32
11	74	12	65	67	53	4	20	12	16	15	38
12	83	18	75	76	62	9	26	23	20	23	49
13	89	25	83	83	70	15	34	41	26	29	55
14	94	40	90	88	77	22	43	57	32	39	59
15	98	51	94	93	84	31	52	73	41	47	66
16	100	64	98	96	90	45	62	84	50	60	74
17		79	100	98	93	65	80	91	61	72	78
18		87		100	95	86	89	96	75	87	88
19		93			98	98	96	98	86	95	93
20		100			100	100	100	100	100	100	100
M	12.2	16.5	13.2	13.6	14.3	17.5	12.4	16.5	16.3	16.5	15.3
SD	1.6	1.6	1.6	1.7	1.3	1.4	1.6	1.5	1.7	1.6	1.6

core

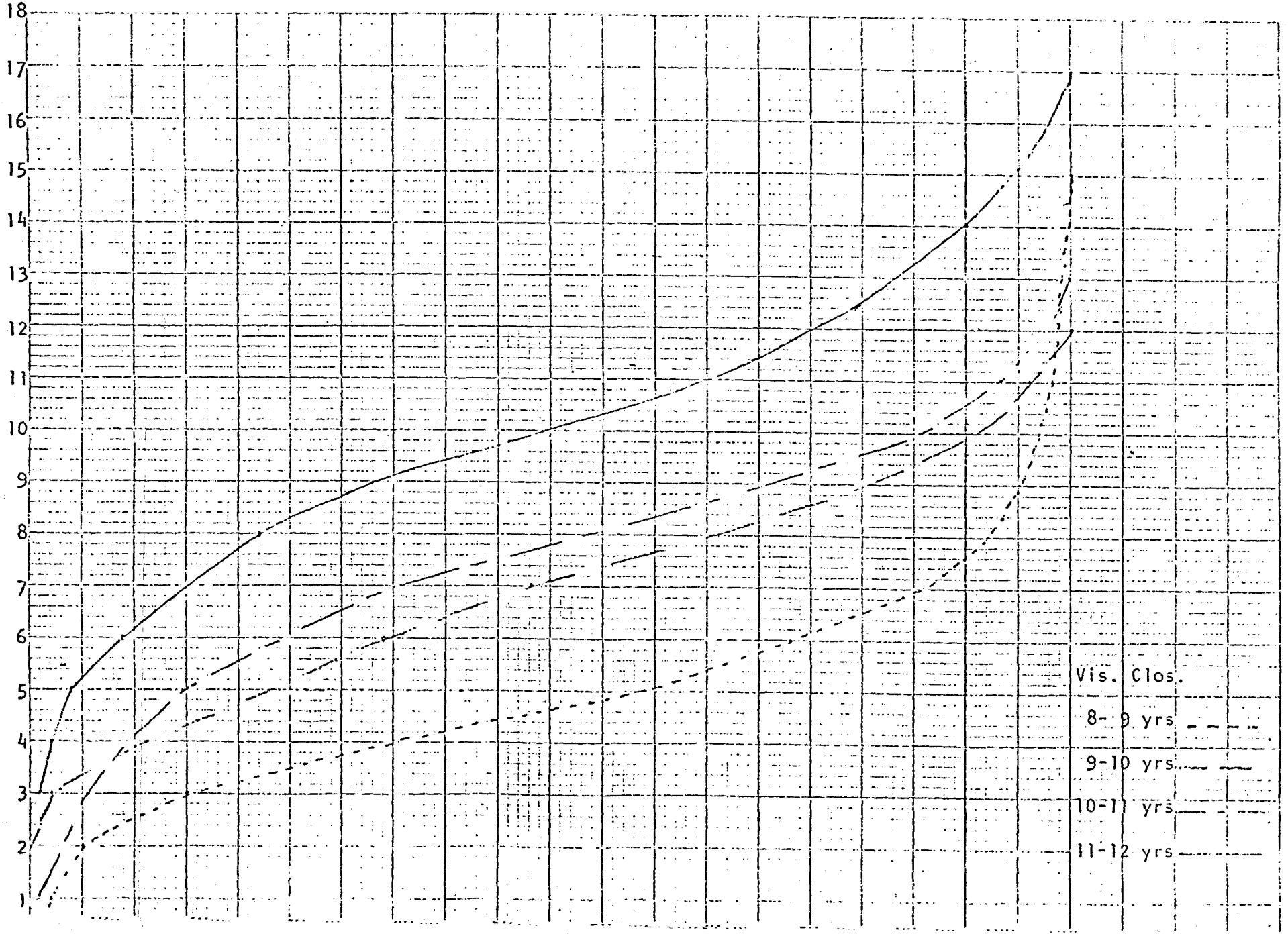

18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Vis. Disc.
8- 9 yrs.
9-10 yrs
10-11 yrs
11-12 yrs

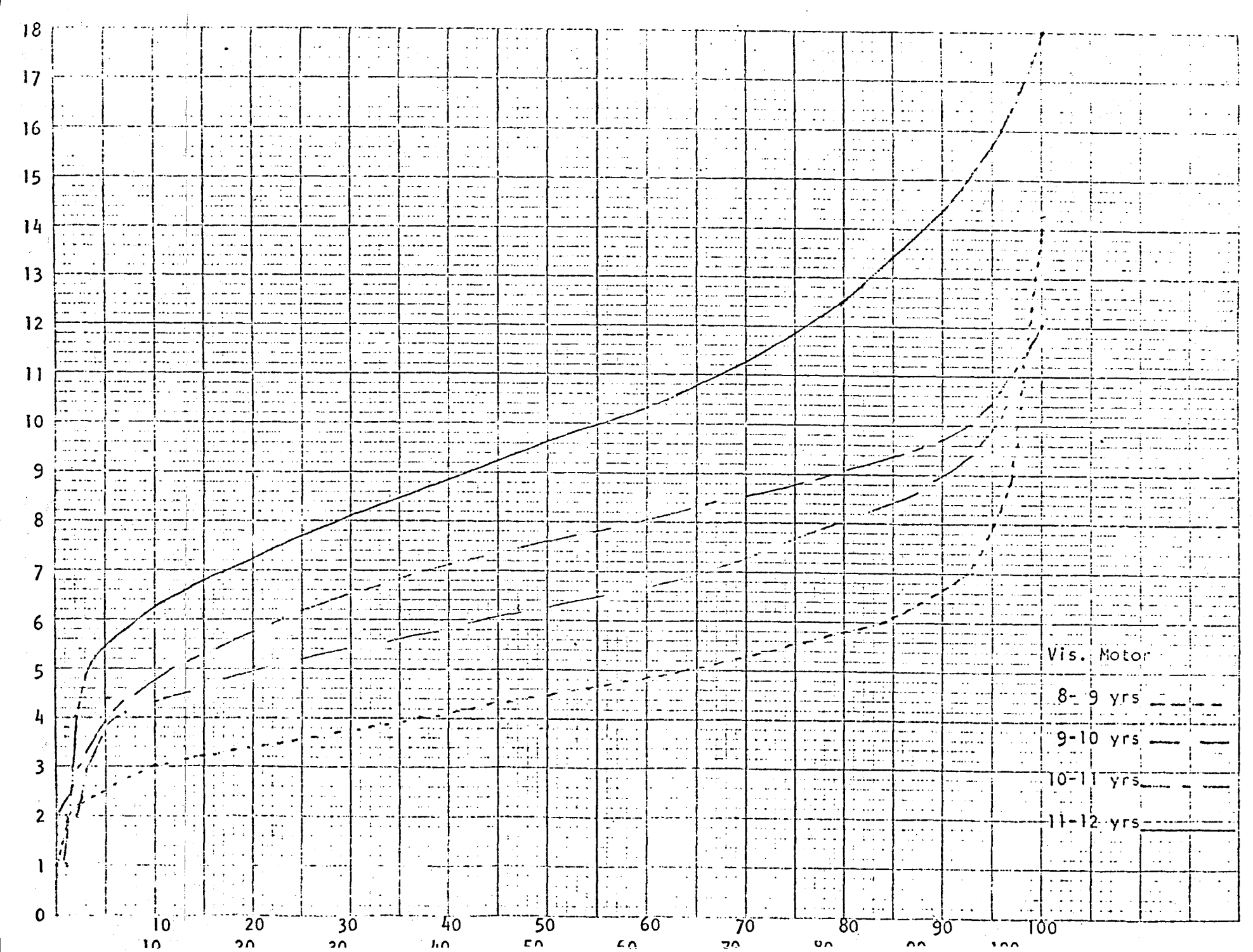
41

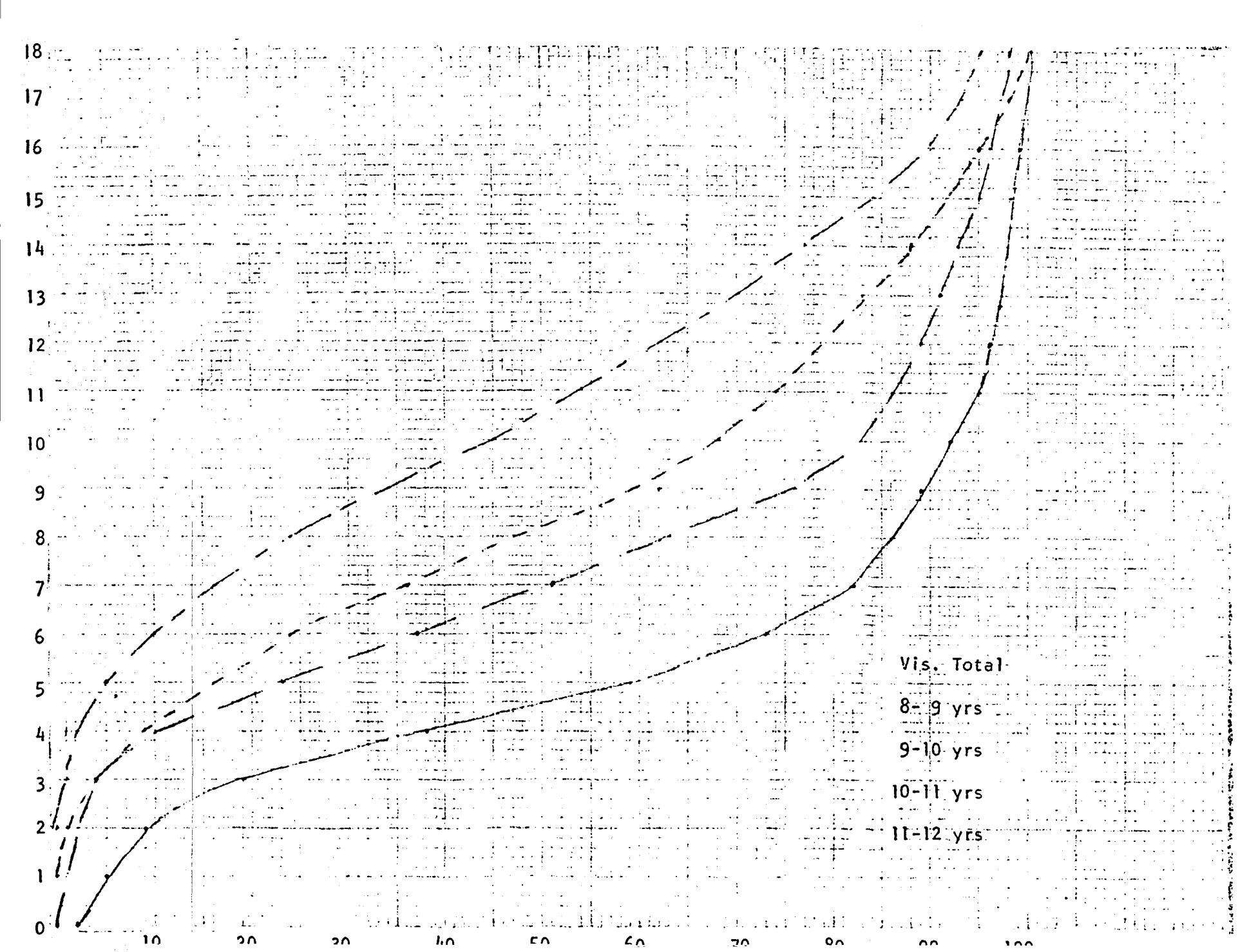
ore

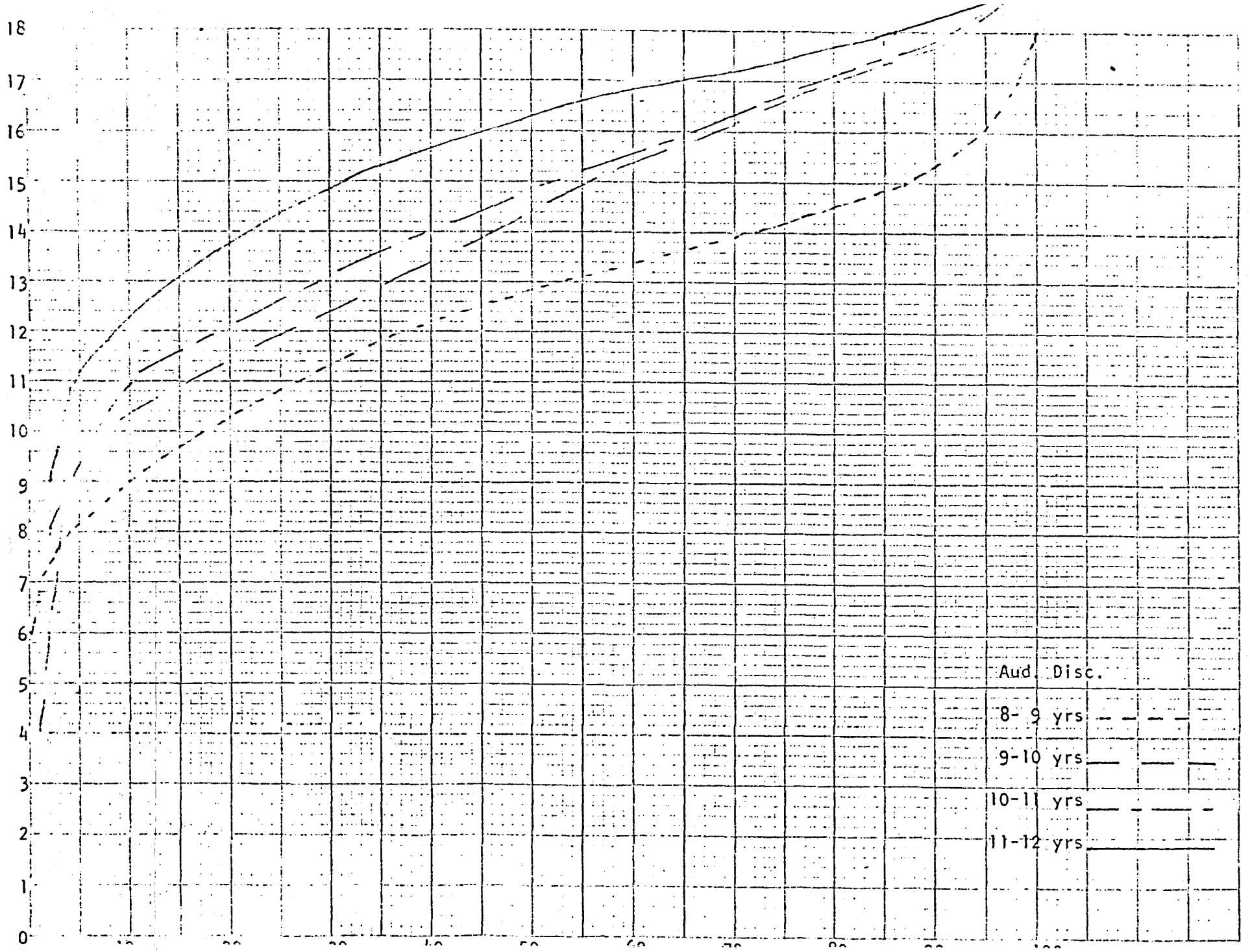

18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Vis. Mem.
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs

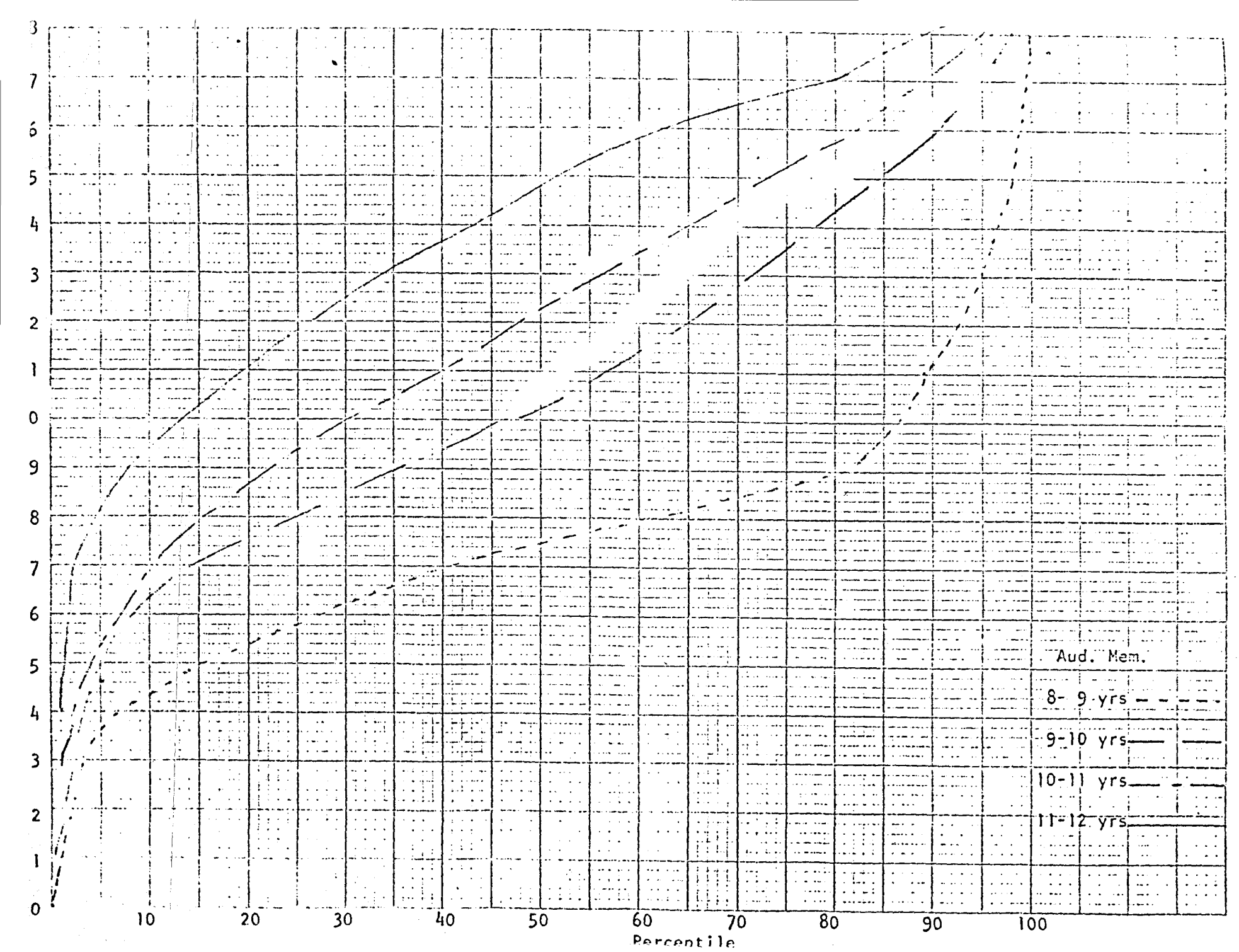
42

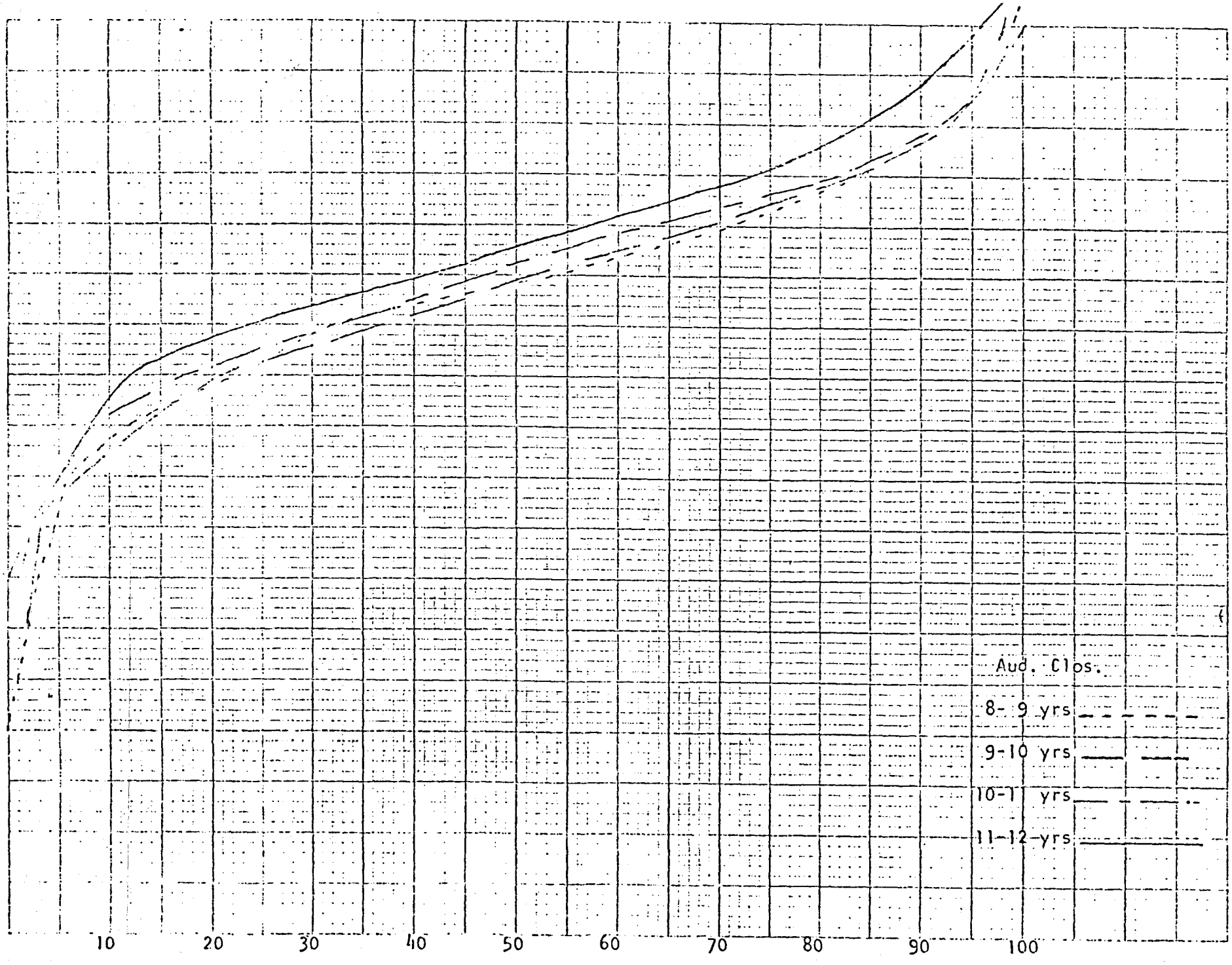

18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Vis. Clos.
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs

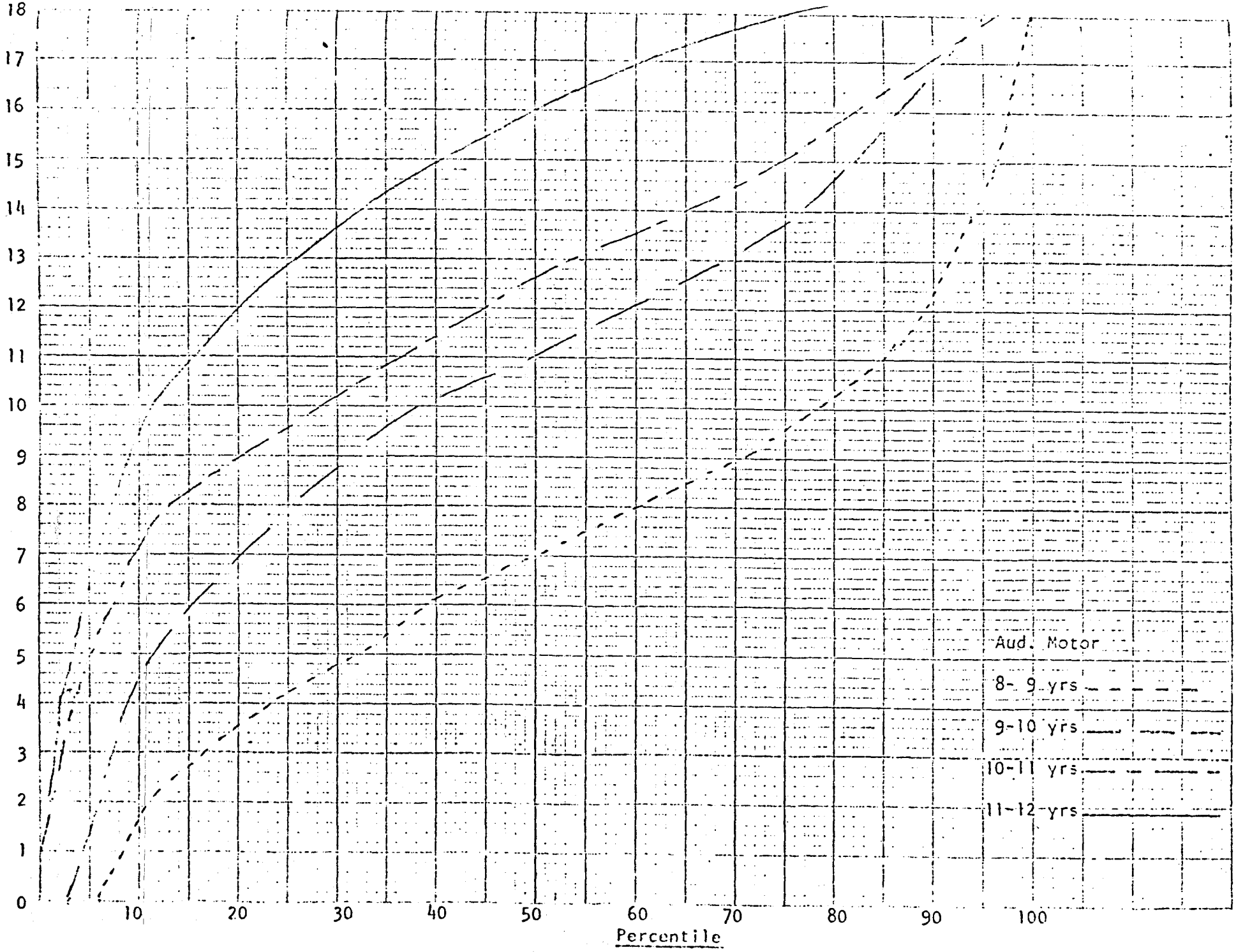

Vis. Motor
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs

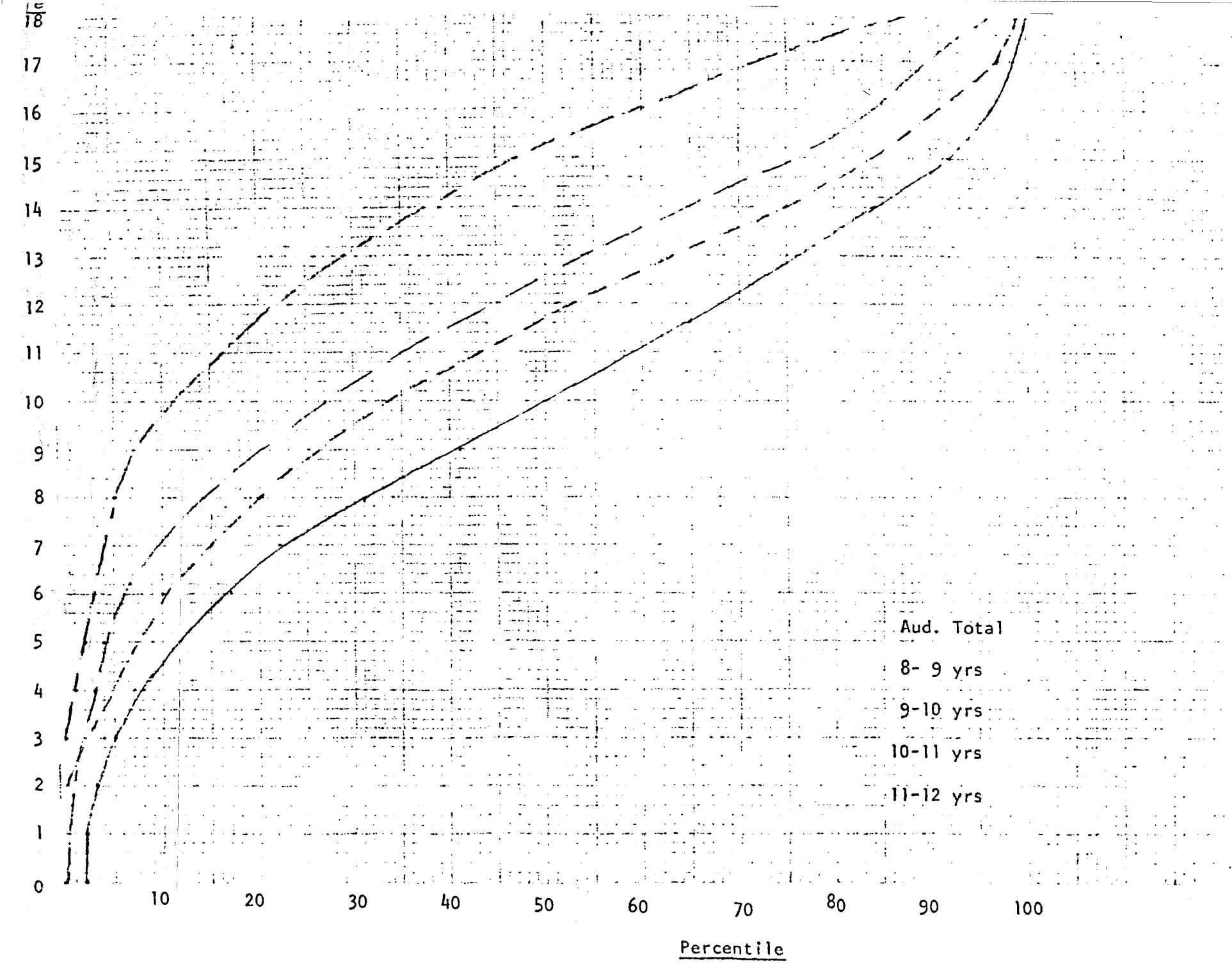

18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Vis. Total
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs

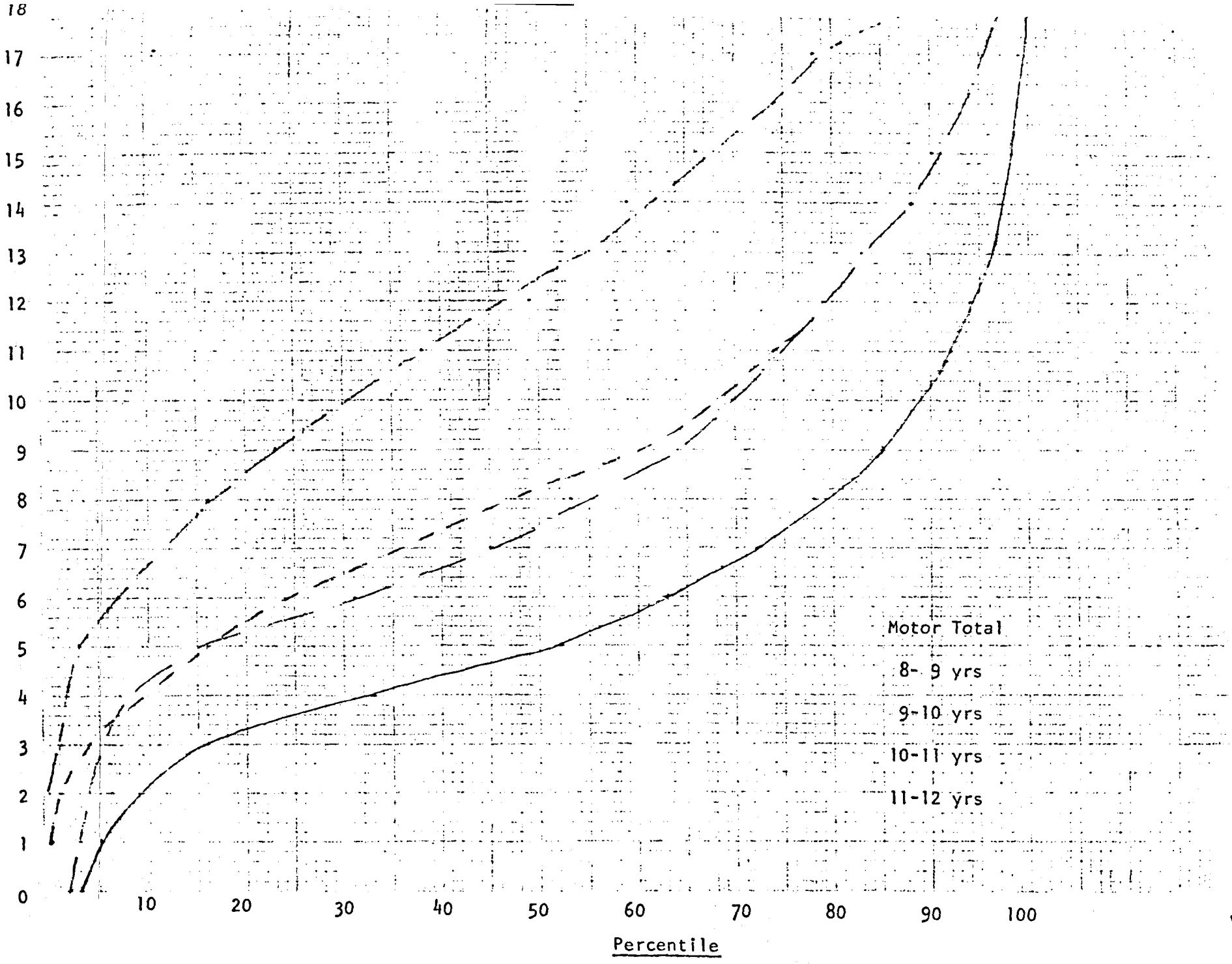

18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Aud. Disc.
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs


Aud. Mem.
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs
10
20
30
40
50
60
70
80
90
100
Percentile


18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
10
20
30
40
50
60
70
80
90
100
Aud. Clos.
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs


18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
10
20
30
40
50
60
70
80
90
100
Percentile
Aud. Motor
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs


Aud. Total
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
10
20
30
40
50
60
70
80
90
100
Percentile


18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
10
20
30
40
50
60
70
80
90
100
Percentile
Motor Total
8- 9 yrs
9-10 yrs
10-11 yrs
11-12 yrs

Validation of Upper KLMT

Content Validation:

The sub-tests of the KLMT are based on the concept of exaggerated work sample items given under conditions of standardized short time periods (Siegal, 1969, p. 51-52).

The visual tests are intended to measure discrimination, memory, closure, and visual-motor cross modality function. (Kaluger and Kolson, 1969; Crosby, 1969; Johnson and Myklebust, 1967)

The auditory sub-tests are similarly based, drawing on suggestions found in Wepman (1958), Frierson and Barbe (1967), Heilman (1967), Schini (1970), and Smith (1969).

Criteria Related Validation:

The criteria used for validity determinations include diagnostic data from specialists, that is, diagnostic clinicians, psychological testing services and physicians. Report card grades, Fall 1973, and teachers' comments, Spring 1973, were also compared with the KLMT results. All coefficients cited are either significant at the .01 level, or if cited as not significant, the .05 level is indicated. The findings are presented below.

In this comparison a simple percentage of coincidence was computed. The comparative data was not available in mathmatical form therefore it was necessary to count the occurrence of individuals with KLMT diagnosis which matched the performance data or clinical diagnosis. These matches are calculated as a percentage of the total population which has comparative data. These percentages were converted to coefficients for uniformity of presentation. The population size for these data is such that the figures presented are significant at the .01 confidence level.

Criterion	Coefficient of correlation by age level				
	8-9 yrs	9-10 yrs	10-11 yrs	11-12 yrs	Total
Specialist	.87 76%	.82 67%	.87 76	.91 83	.87 76
Grades	.86 74%	.89 79	.94 88	.85 72	.88 77
Teacher Comment	.87 76%	.88 77	.84 71	.92 85	.87 76
Number	88	92	83	90	353

Construct Validity:

A number of hypotheses have been tested in determining the validity of the KLMT. Findings reported in the literature have been checked against KLMT results and certain KLMT findings have led to additional studies which bear on the validity of the test.

It has been stated that the occurrence of learning disabilities ranges from 5 to 25 percent in the school population (Meier, 1971). It has been stated that severe disabilities occur in 4 to 5 percent (Kass, 1969; Cruikshank, 1967). Moderate disabilities have been estimated to occur in 15 to 25 percent of the population (Hurst, 1968).

For comparative purposes it is here assumed that a KLMT score in the disability range in only one perceptual modality indicates a moderate disability while two or more modalities in the disability range represents a severe disability. In the four age groups tested with the upper KLMT the following distribution was found.

Age Group	8-9 yrs.	9-10 yrs.	10-11 yrs.	11-12 yrs.	Total
Single Disabilities	17%	15%	6%	20%	14%
Two Disabilities	3%	11%	5%	12%	8%
Three Disabilities	3%	5%	2%	2%	3%
Number	88	92	105	88	373

These findings may be summarized for the total group as: moderate disability, 14%; severe disability, 11% total occurrence, 25%. Thus the KLMT findings are in good agreement with informed estimates of learning disability occurrence. That

the KLMT is not biased toward one perceptual modality is shown by the distribution of diagnosed disabilities by modalities. Visual disabilities were found to occur in 34% of the cases, auditory disabilities in 32% and motor disabilities in 33%. This even distribution suggests that the KLMT is not weighted toward one perceptual modality.

Analysis of the distribution of disabilities according to the sample population.

Age Group		Male	Female	Black	White	Other	Upper	Middle	Lower
	% of Pop.								
8- 9		45	55	8	91	1	31	64	5
	Disab.	60%	40%	16%	84%	0%	20%	68%	12%
9- 10		40	60	13	87	0	20	68	12
	Disab.	62%	38%	21%	79%	0%	20%	62%	17%
10- 11		41	59	8	91	1	20	72	8
	Disab.	53%	46%	15%	85%	0%	15%	62%	23%
11- 12		57	43	5	95	0	30	65	5
	Disab.	77%	23%	0%	100%	0%	30%	63%	7%
Total		46	54	8	91	1	25	67	8
	Disab.	63%	37%	13%	87%	0%	21%	64%	15%

In this distribution it may be seen that disabilities are found in a ratio of about 2:1 in boys. Estimates in the literature range from 2:1 (Johnsom and Myklebust, 1967) to 7:1 (Silver, 1971). In this table the occurrence in boys runs from 1:1 to 4:1.

Disabilities were found to occur proportionately higher in children from the lower socio-economic level than in other groups. This finding has been noted by Oakland (1969). The higher incidence seems to relate more to the socio-economic level than to the racial designation. This finding may be significant for future study.

The hypothesis has been stated that the auditory perceptual modality is the more important learning channel (Oakland, 1971, Bannatyne, 1971). To investigate this hypothesis it was predicted that a high correlation would be found to exist between KLMT auditory percentile scores and the percentile score

on reading comprehension. KLMT test results were sorted by modality preference as defined previously (one modality 10 points higher than the other). The KLMT administered in September, 1973 and the SRA standardized achievement series administered in the same month were compared. Pearson Product-Moment Coefficient of Correlation was calculated comparing the KLMT auditory percentile of the 136 auditory preference children with their SRA reading comprehension percentile. The Pearson Product-Moment correlation coefficient was used rather than the Spearman Rank-Order coefficient because the sample exceeds thirty measurements. For this calculation the SRA reading percentiles were set down as the X column and the KLMT auditory percentiles for the same individuals were set down as the Y column. The coefficient found was .760, significant at the .01 level.

As a check on this finding it was predicted that Visual preference children would show a significantly lower correlation between reading comprehension and visual percentile. The same calculation was made with 120 visual preference children and the correlation found between visual percentile and reading comprehension was .018, not significant at the .05 level.

It was suggested at this point thatthe test results were simply reflecting IQ differences. To investigate this possibility the test results were sorted by modality preference and age group and the IQ distributions were compared.

Age Group	N	IQ-Vis. Pref.	IQ- Aud. Pref.	IQ- No Pref.
8- 9	56	108+-17 34%	110+-17 32%	108+-27 34%
9- 10	85	105+-30 35%	104+-30 32%	104+-33 33%
10- 11	76	103+-23 36%	102+-21 32%	108+-25 33%
11- 12	77	98+-25 30%	113+-29 40%	112+-25 30%

This tabulation clearly demonstrates two things: The IQ distribution is not the effect measured by the preference-achievement correlations and again the lack of bias in the KLMT is shown.

Reliability of the KLMT

Over the three years during which the KLMT has been developed many of the same children have been tested repeatedly. Findings of disability by modality and of modality preference have been the same so consistently that these findings have been accepted as diagnostic within the school. However, a test-retest reliability determination could not be made until the KLMT was administered in its final version. This calculation was made on the students from the 1972-73 fifth grade group and the 1973-74 sixth grade group. The Pearson coefficient of correlation for test retest is as follows:

Visual test-retest= .630, significant at .01; auditory test-retest= .653, significant at .01. These results suggest a high reliability for the KLMT. For this determination the Pearson formula was used because the sample contains more than 30 measurements (N=65). Calculation was made by setting the 1972-73 scores as the X values and the 1973-74 scores as the Y values. This method was also chose as a guarantee of not over-estimating the reliability. In the area of disability diagnosis the repeatability of the instrument exceeds 90 percent.

Possible uses for the KLMT

At this time a number of applications for the Upper Level KLMT may be suggested. The original purpose, diagnosis of learning disability, seems to be well met. It now appears that there well may be additional uses for the instrument. In view of the modality preference data it seems that the KLMT could be used in conjunction with aptitude and skill tests in guidance counciling of older children. Longitudinal studies with the KLMT could shed light on the maturational effects on perceptual abilities. The KLMT was administered experimentally to about 100 college students and the results checked by interview. The findings here suggest a validity that cannot be quantified but it seems that the test is suitable for testing adults. Here it is possible that valuable data could be produced to study possible

tendencies toward specific modality preferences in ethnic groups, trade and professional choices and in the arts. KLMT data could be of value in the selection of teaching materials and methods. Finally, the KLMT should be a useful tool in research into the etiology of perceptual learning disabilities.

Summary

The KLMT is a group test of perceptual modality functioning. It is normed by age groups on a well distributed population sample. It is a classroom administered instrument requiring about 45 minutes time to test a large group (25- 30 children). The KLMT has been well validated and has a high reliability. Results obtained with this instrument are useful directly to the classroom teacher and to the curriculum counselors. Further and extended study of this test will undoubtedly reveal uses that have not yet been explored.

KLMT - Upper Level - Administration

A. Materials in KLMT - Upper Level Unit are as follows:

1. Manual - 1 for each group to be tested at one time
2. Test booklets - 1 for each person to be tested at one time
3. Score sheets - 1 set per testee
4. Profile sheets - 1 per testee
5. Cassette tape or reel as requested containing the auditory tests

B. Equipment or materials to be supplied by tester are as follows:

1. No. 2 pencils or pens - 2 for each testee
2. Stop watch
3. Tape player - good cassette or reel to reel

C. General Instructions

1. Be informal; a relaxed, normal classroom situation is best.
2. Be ready to give additional examples for clarity if needed before testing starts. No help can be given after timing is begun.
3. Adhere rigidly to work time specifications. Use a stop watch.
4. Specific instructions for each sub-test are found at the head of each test. Cursive or manuscript writing may be used.
5. Read all visual test instructions orally while students read silently.
6. Auditory tests:
   a. Read all auditory test instructions orally while students read silently.
   b. Start the tape when students are ready for the test. When the sub-test is ended, stop the tape and prepare for the next part.
7. Total test work time is about 10 minutes.
8. Total administration time is about 45 minutes.

D. Scoring:

1. Record total correct answers for each sub-test as seen through template.

   a. Visual Discrimination - 20 total - use appropriate norm table for percentile

   b. Visual Memory - 20 total - use appropriate norm table for percentile

   c. Auditory Discrimination - 20 total - use appropriate norm table for percentile

   d. Auditory Closure - 20 total - use appropriate norm table for percentile

2. Record total correct groups in Visual Closure - 20 total - use appropriate norm table for percentile

3. Record words or numbers copied correctly in Visual Motor - 20 total - use appropriate norm table for percentile

4. Record correct letter or digit and/or correct plus or minus in correct place in Auditory Memory - 20 total - use appropriate norm table for percentile

5. Record correct letter or digit in correct sequence in Auditory Motor - 20 total - use appropriate norm table for percentile

6. No score is given if all answers are marked the same (S or D)

7. Total scoring time about a minute per student

E. Profile Sheets

1. Complete as many blanks as possible

2. Standardized Test Results - use IQ scores

3. Specialist Data - psychologist, speech theropist, reading specialist, physician

4. Present Scholastic Standing - report card grades and/or achievement test scores

5. Observation - permanent record comments such as the following:

   lazy, daydreams, disruptive, poor writing, doesn't finish, inattentive, eager, excellent, talks well, hard worker

6. Total Visual - average total raw score - use appropriate norm table for percenti

7. Total Auditory - average total raw score - use appropriate norm table for percentile

8. Total Motor - average total raw score - use appropriate norm table for percentil

9. Profile - use percentiles - keep modalities separate

10. Recommendations - see interpretation

11. Total profiling time less than 5 minutes per student

Description of the Primary KLMT

The Primary KLMT is designed for the identification of perceptual learning disabilities and perceptual modality strengths . It is a group instrument for administration in the classroom by the classroom teacher. The sub-test items are basically the same as in the Upper Level KLMT, with a reduction in complexity of some items and with increased time allowed in some sub-tests. The time required for administration is about 45 minutes. In the Primary KLMT all work is done in the test booklet rather than on separate answer sheets.

The Primary KLMT sub-tests are as follows:

I. Visual

A. Discrimination - students compare pairs of number and letter groups and mark S or D for same or different.

B. Memory - students study designs then turn to larger collection of designs and mark S or D as determined by whether designs had been studied in previous group or not.

C. Closure - students write letters or numbers perceived in list of broken letters and numbers.

D. Motor - students copy list of nonsense words and numbers.

II. Auditory - on tape

A. Discrimination

1. Students mark S or D determined by whether pairs of nonsense words rhyme or not.

2. Students mark S or D determined by whether pairs of nonsense words have same or different first vowel sounds.

B. Memory - students write + or - and letter or digit added or left out of second member of pairs of letter and number groups.

C. Closure

1. Students mark S or D determined by whether broken nonsense words and blended words are the same or different.
2. Students mark S or D determined by whether incomplete and complete nonsense words are the same or whether the second word has been changed instead of completed.

D. Motor - students write letters and numbers from dictation.

III. Motor is a combination of the visual and the auditory motor subtests.

Standardization of the Primary KLMT

The Primary KLMT was standardized on the first, second and third grade population of J. B. Watkins Elementary School. There were approximately 200 children in three age groups in this population.This normative population is compared with the national population distribution in the following table.

		Watkins %	National %
Sex	Male	52	49
	Female	48	51
Race	White	89	89
	Black	11	10
	Other	0	1
Economic	Upper	23	25
	Middle	70	60
	Lower	7	15
Geographic	Rural	0	49
	Suburban	100	21
	Urban	0	30

This shows that the Watkins normative population for the Primary KLMT compares well with the national population as reported by the Bureau of Census and cited in the 1971 World Almanac in all but the geographic distribution. The same suggestion in this regard as made in the Upper Level standardization applies here.

The Primary KLMT was administered by a trained non-professional aide and the standardized percentile were derived by the methods described in the Upper Level KLMT standardization. The tables of percentiles follow.These tables are in one year age units.

Primary KLMT Norms - 6 - 7 years

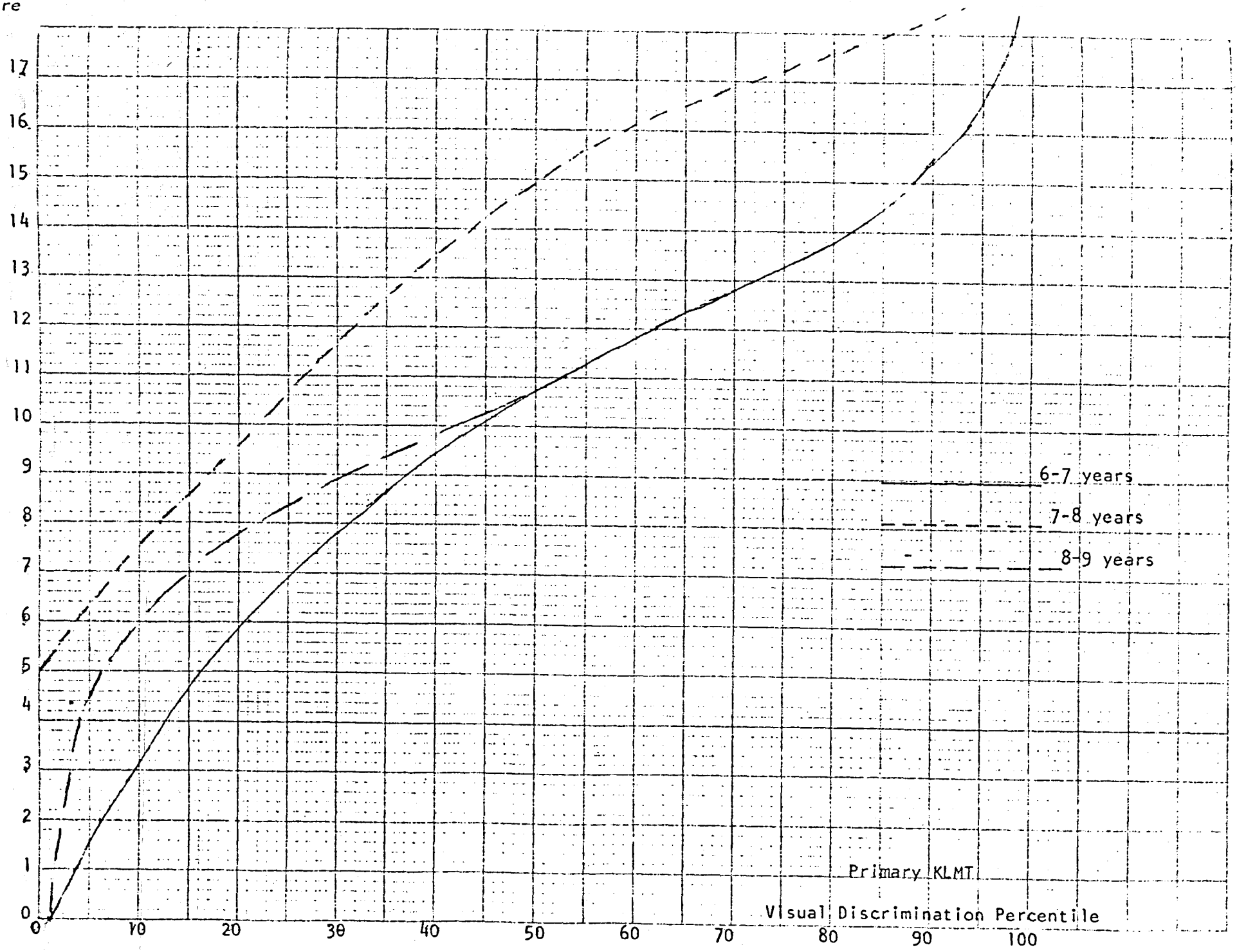
Score	Visual Percentile					Auditory Percentile					Motor
	Disc.	Mem.	Clos.	Motor	Total	Disc.	Mem.	Clos.	Motor	Total	Total
0	1	1	6		2	4	15	7	7	4	4
1	4	2	10	0	4	5	17	9	12	4	6
2	6	3	15	1	6	7	20	10	16	5	9
3	9	4	20	3	9	9	23	12	21	6	12
4	13	6	27	4	13	12	28	13	27	8	16
5	16	10	35	6	17	15	32	15	33	12	20
6	21	13	47	12	22	18	39	18	38	16	26
7	25	17	60	23	30	23	46	22	43	22	33
8	31	21	75	38	41	27	55	26	48	39	42
9	37	25	86	51	53	33	63	32	53	37	53
10	44	29	94	66	61	40	72	38	59	49	66
11	53	34	96	80	68	50	80	47	68	58	76
12	62	41	98	91	74	63	87	58	75	67	85
13	72	48	100	95	79	75	92	73	81	77	89
14	82	57		97	84	85	96	88	86	81	93
15	88	68		98	89	93	97	95	91	93	96
16	93	80		99	93	98	99	98	95	97	97
17	96	91		99	96	100	100	100	97	99	98
18	98	97		100	98				99	100	99
19	99	99			99				100		100
20	100	100			100						
M	14.3	15.1	9.0	13.3	14.0	12.5	11.2	12.4	12.6	13.2	13.2
SD	1.9	1.8	1.6	1.7	1.9	1.9	1.9	1.8	2.0	1.8	1.9

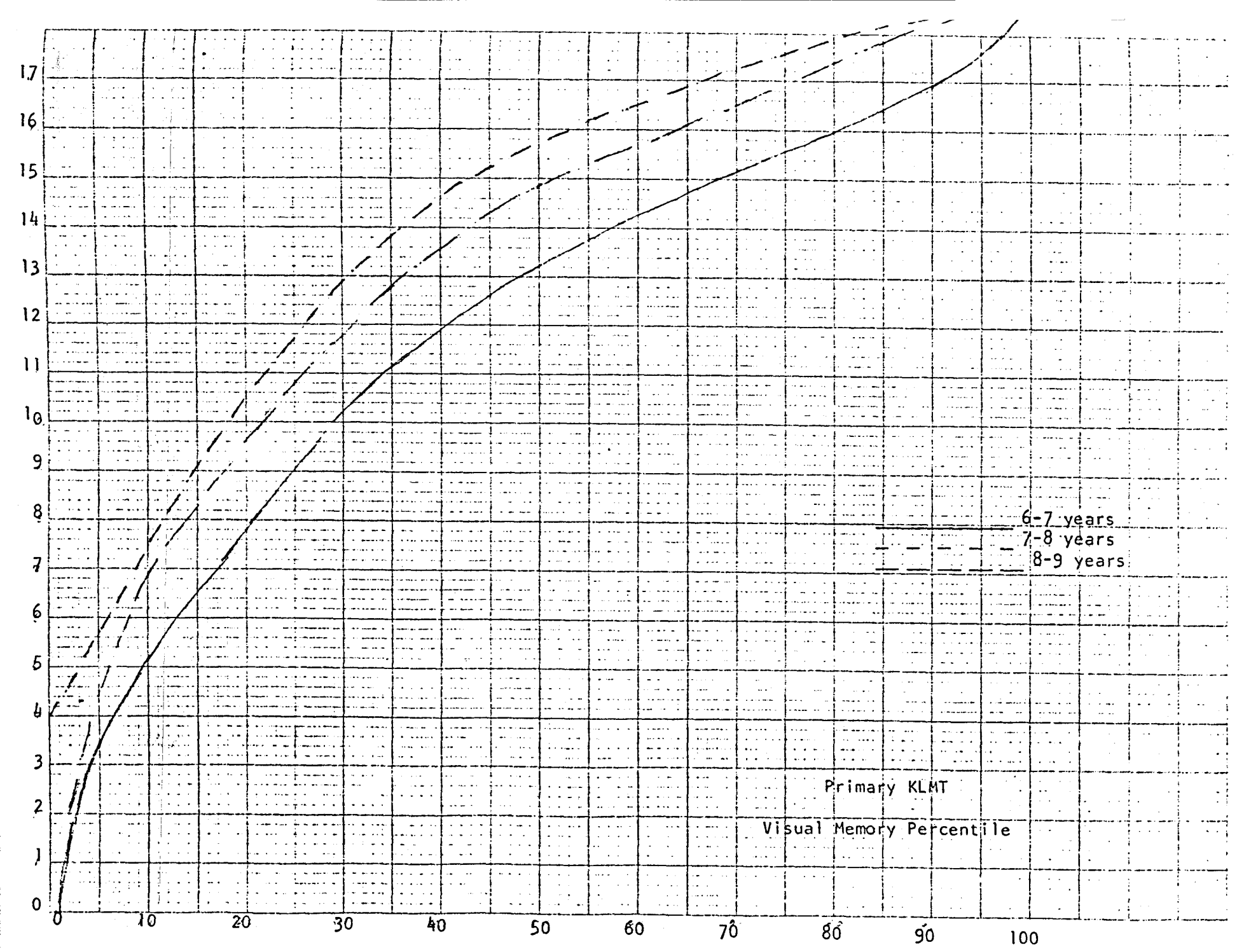
Primary KLMT Norms - 7-8 years

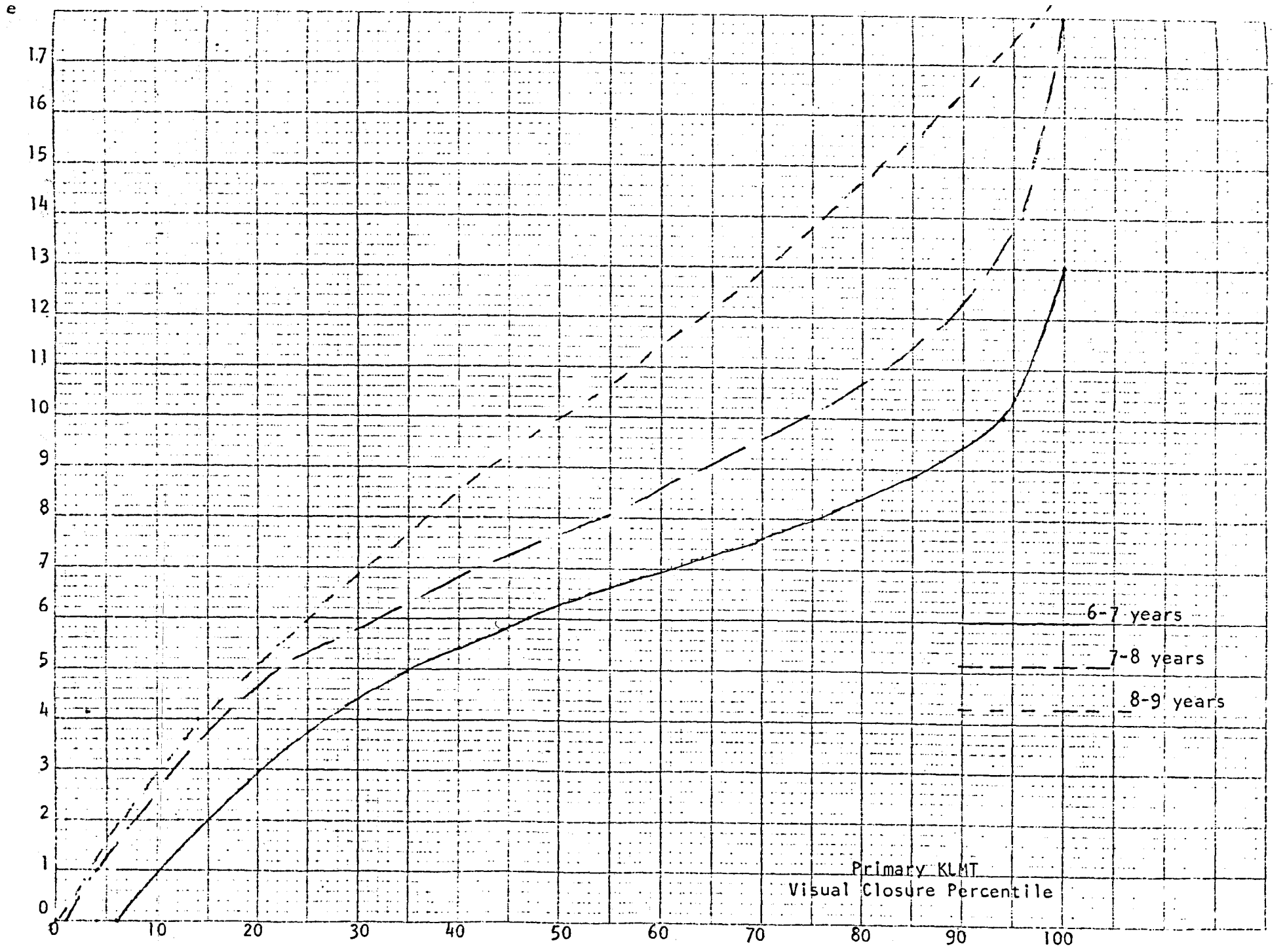
core	Visual Percentile					Auditory Percentile					Motor
	Disc	Mem.	Clos.	Motor	Total	Disc.	Mem.	Clos.	Motor	Total	Total
0	1	1	1		0	1	9	1	3	8	1
1	2	1	4		1	1	11	1	4	10	2
2	2	2	8	0	3	2	13	1	7	12	4
3	3	3	12	0	4	3	17	2	10	15	5
4	4	4	16	1	6	3	20	2	14	18	7
5	6	6	22	1	9	4	27	2	18	22	10
6	10	8	32	4	14	5	34	2	24	27	14
7	15	10	42	9	20	8	46	4	30	31	20
8	22	14	50	16	27	13	55	6	39	37	27
9	31	18	64	25	35	20	63	12	47	43	36
10	42	22	74	42	46	31	72	25	56	52	50
11	53	26	82	60	57	41	80	40	65	60	63
12	62	31	89	74	66	54	88	56	74	68	72
13	72	36	93	84	73	67	92	69	81	77	81
14	82	43	96	91	79	79	96	84	86	86	90
15	88	52	97	96	84	90	97	92	91	93	95
16	93	64	99	98	89	98	99	97	95	97	97
17	96	75	100	99	93	100	100	100	97	99	98
18	98	87		99	96				98	100	99
19	99	96		100	98				99		100
20	100	100			100				100		
M	14.9	15.6	11.9	14.0	14.6	13.6	11.6	13.9	14.0	12.5	14.6
SD	1.8	1.6	1.3	1.6	1.6	1.6	1.9	1.4	1.9	1.9	1.8

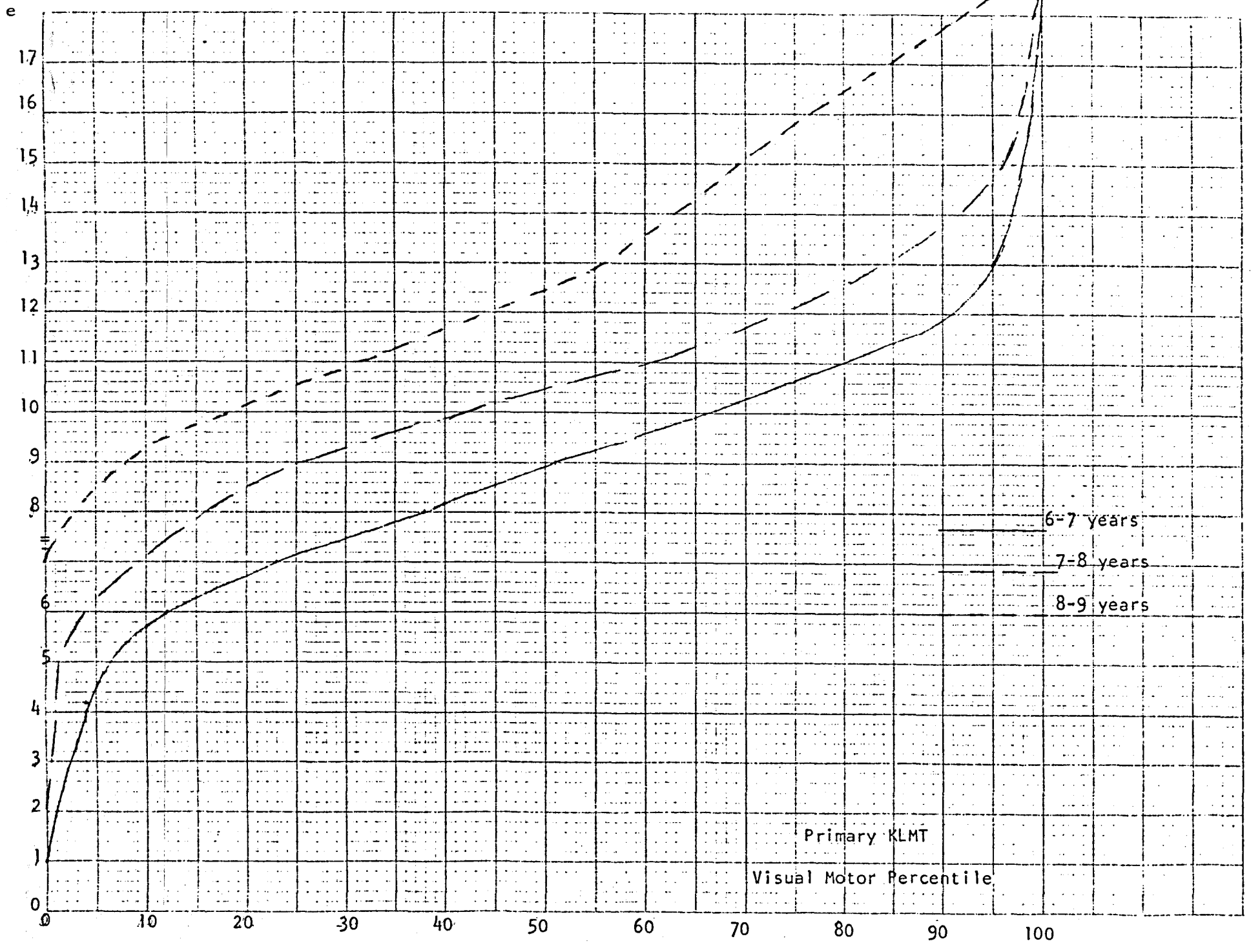
Primary KLMT Norms - 8-9 years

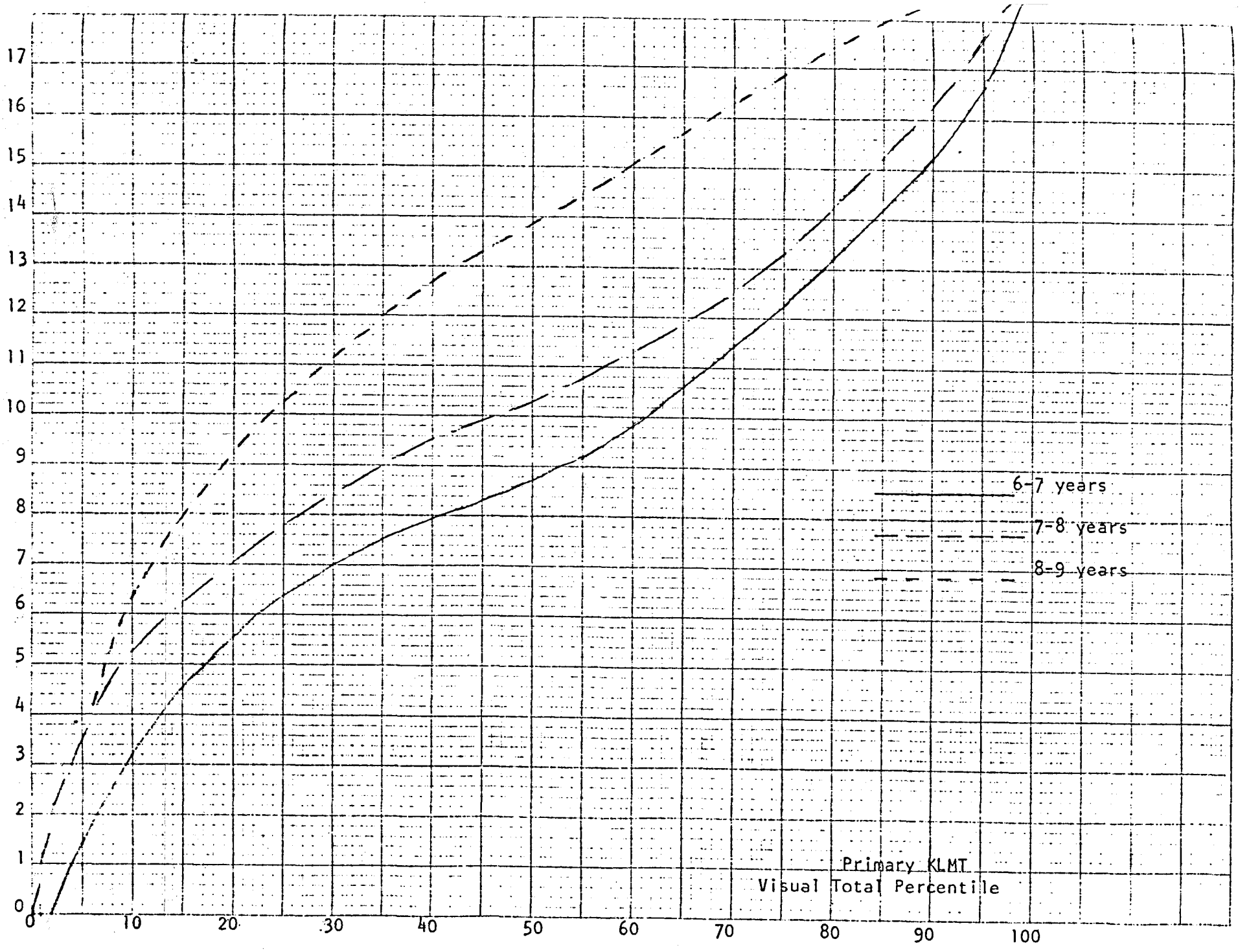
Score	Visual Percentile					Auditory Percentile					Motor
	Disc.	Mem.	Clos.	Motor	Total	Disc.	Mem.	Clos.	Motor	Total	Total
0			0		0		9	6	6	4	1
1			3		1		10	7	8	4	2
2			6		2		12	9	10	5	4
3			10		4		15	11	12	6	5
4		0	14		6		15	12	14	8	6
5	0	3	20		7	0	24	14	15	12	7
6	4	6	25		9	3	31	16	17	15	8
7	8	9	31	0	12	6	37	17	19	19	10
8	12	12	37	3	15	6	44	19	23	25	13
9	17	15	43	8	19	17	50	24	27	31	18
10	22	18	50	18	24	23	56	32	31	37	25
11	27	22	57	31	29	29	63	41	37	45	34
12	32	26	64	44	35	34	68	50	46	53	45
13	37	31	71	56	42	39	73	60	56	60	56
14	46	36	76	63	51	45	75	69	65	68	65
15	50	43	82	69	60	52	78	78	75	71	74
16	59	53	88	77	68	59	80	94	85	84	82
17	72	67	93	85	76	66	85	100	94	92	89
18	86	81	97	92	86	75	100		100	98	94
19	95	95	100	97	95	90				100	98
20	100	100		100	100	100					100
M	15.9	16.0	16.6	16.1	15.4	15.9	12.2	12.5	13.0	14.0	16.0
SD	1.7	1.7	2.2	1.6	1.5	1.7	1.9	1.6	1.9	1.5	1.6

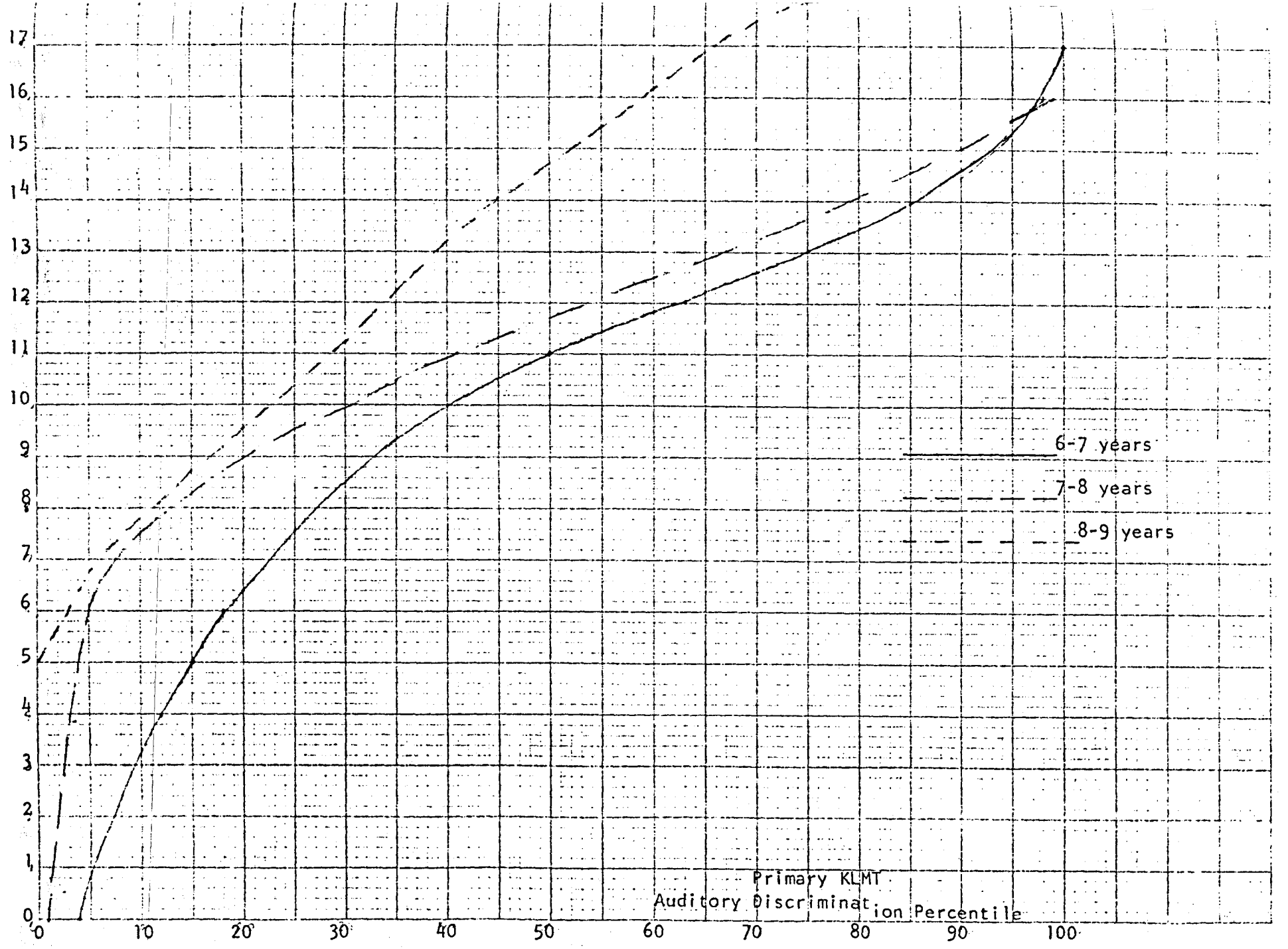

17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Visual Discrimination Percentile

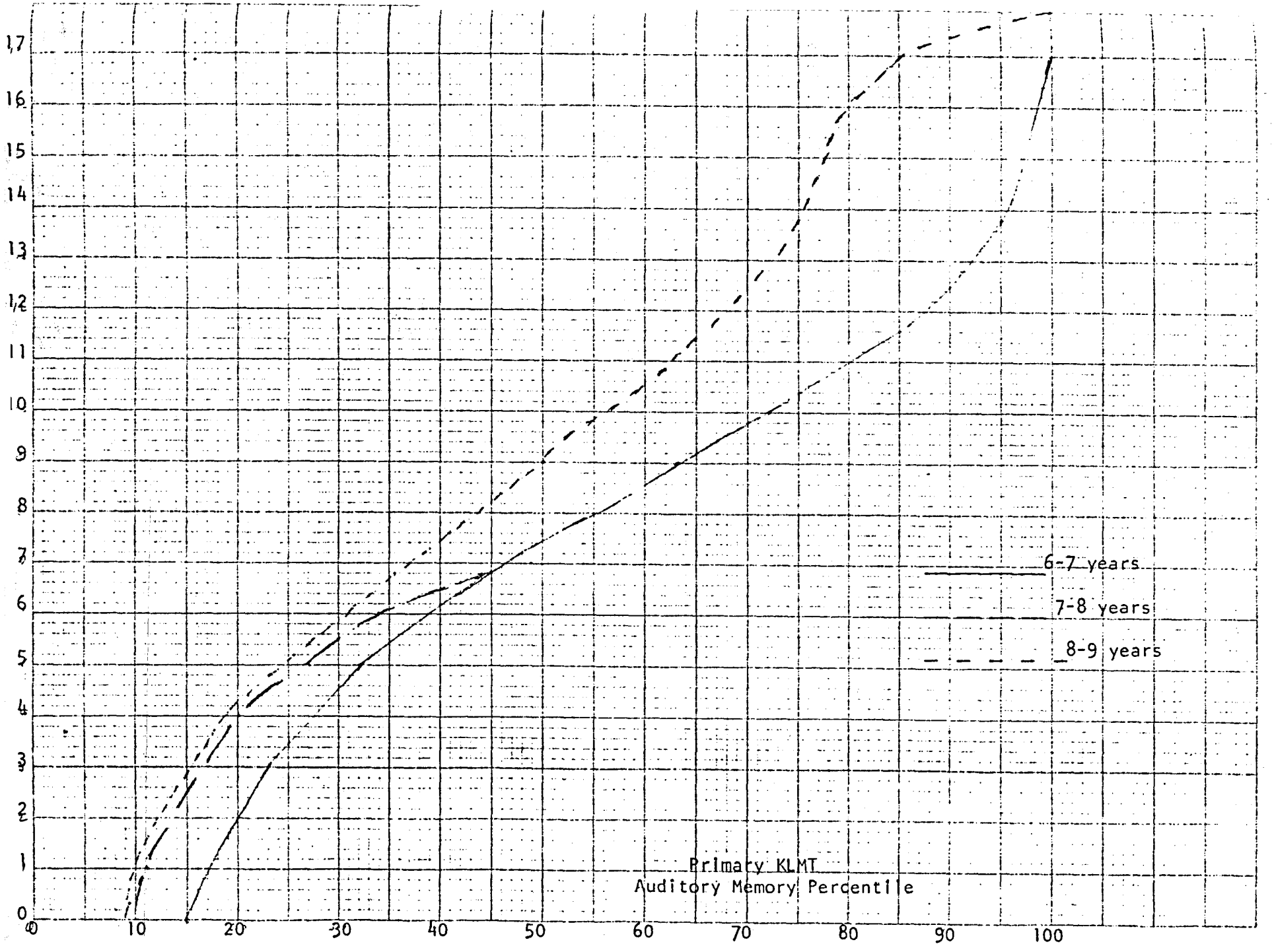

17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Visual Memory Percentile

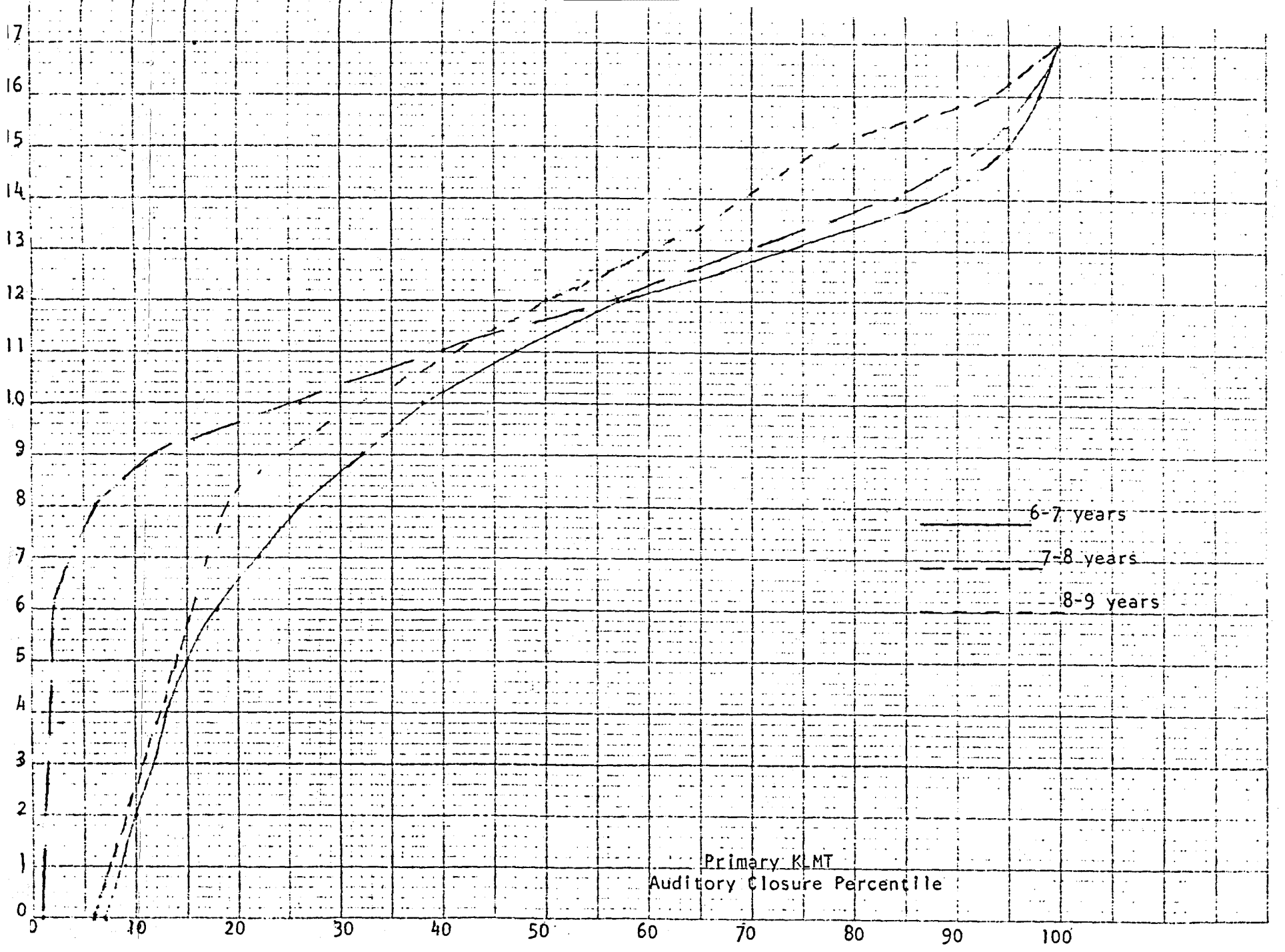

e
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Visual Closure Percentile

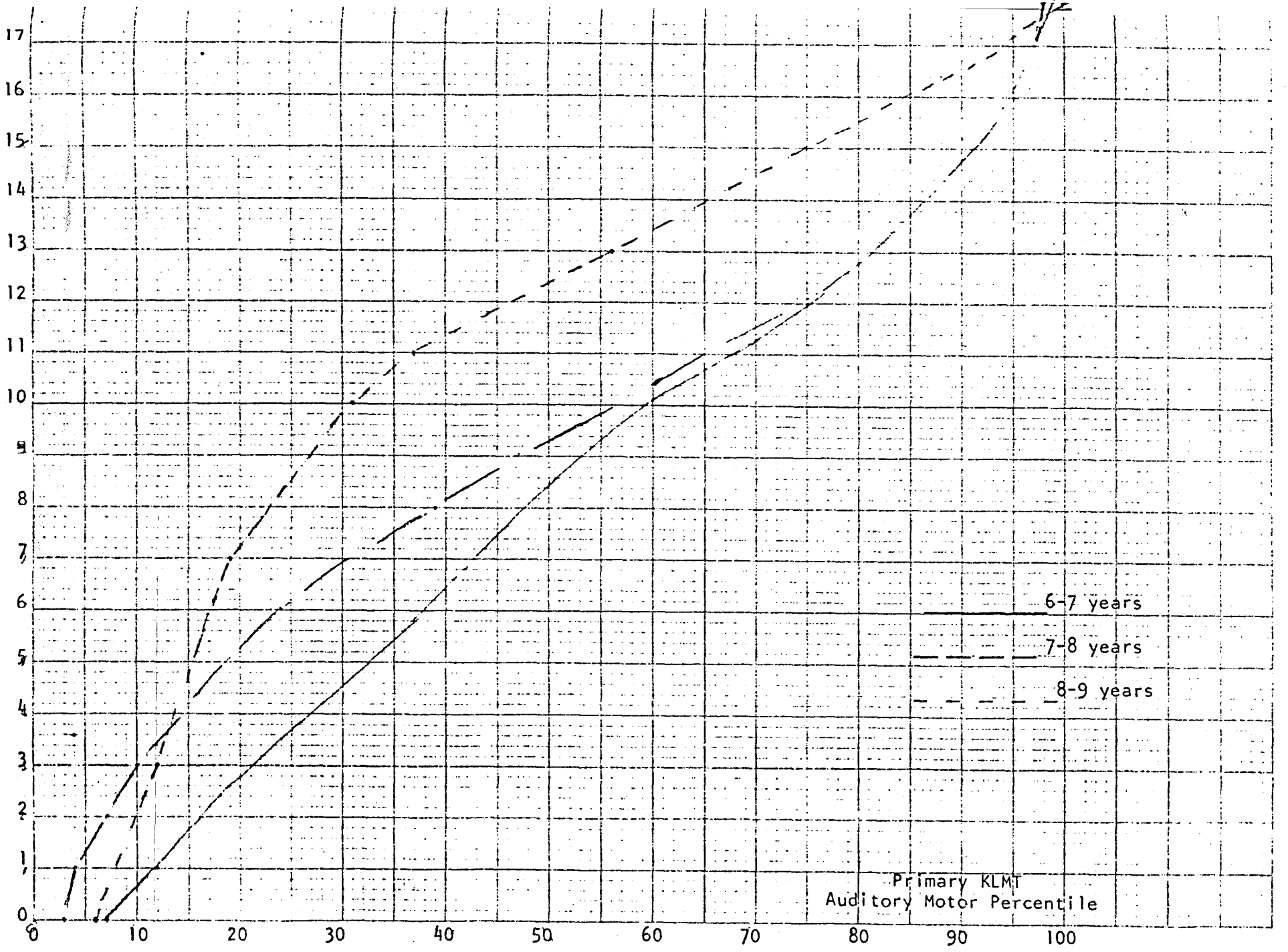

e
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Visual Motor Percentile

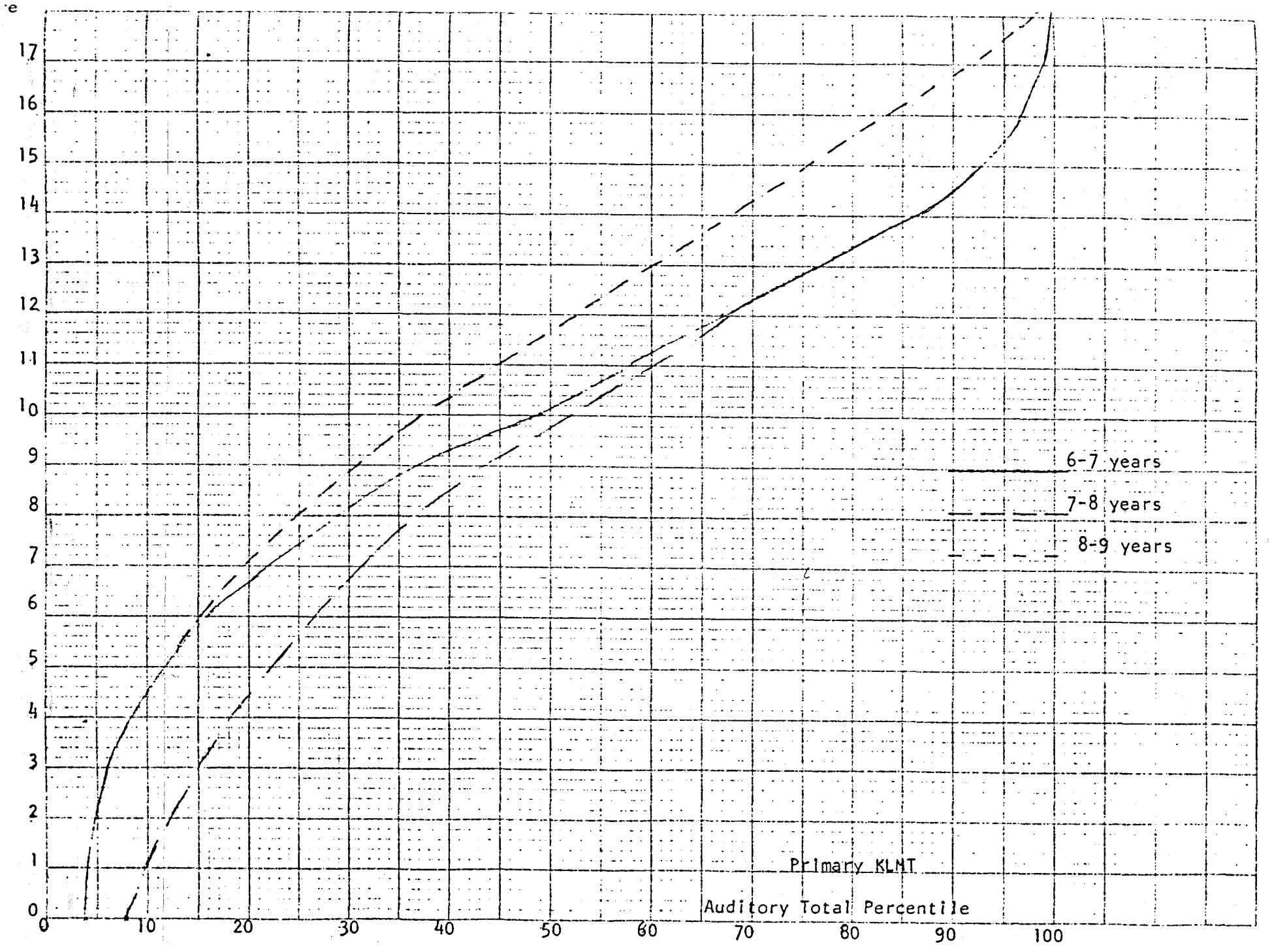

17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Visual Total Percentile

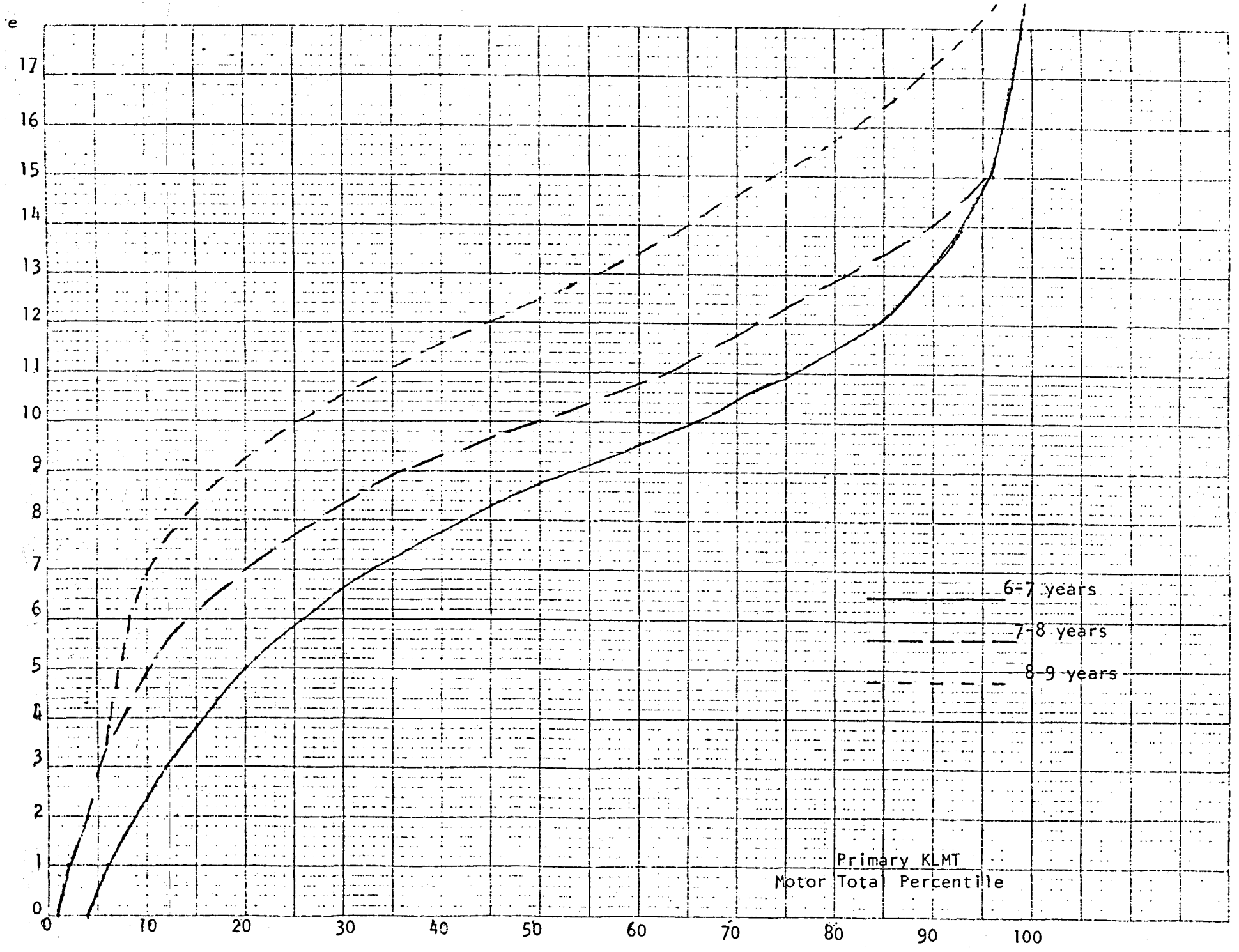

17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Auditory Discrimination Percentile


17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Auditory Memory Percentile


17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Auditory Closure Percentile


17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Auditory Motor Percentile


e
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Auditory Total Percentile


e
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
6-7 years
7-8 years
8-9 years
Primary KLMT
Motor Total Percentile

Validation of the Primary KLMT

Content Validation:

The content validation of the Primary KLMT is the same as for the Upper Level test. The validation for the reduction in complexity of some items and the greater time allowance for others is based on experimental data developed during the trial phases of the test. The working time and the item complexity are so designed that the sub-tests permit full range measurement of each of the perceptual modalities covered.

Criteria Related Validity:

The validation of the Primary KLMT is the same as that of the Upper Level KLMT.The following table gives the results of the validity analysis by criterion.

Criterion	6-7 years	7-8 years	8-9 years	Total	N
Specialist	.708	.775	1.00	.800	11
Grades	.860	.884	.970	.884	183
Comments	.939	.949	.762	.933	142

These validity coefficients are derived by the same method as described for the Upper Level KLMT.

Construct Validity:

All of the material developed in the Primary KLMT is directly based on the Upper Level test. Only the data on distribution of perceptual disabilities is presented here to demonstrate that the same relative incidence is found with this version of the instrument. In the test population boys made up 52% and had 67% of the disabilities. Whites made 89% of the population with 88% of the disabilities. Upper socio-economic; 23% of population, 12% of disabilities: Middle; 70% with 73%: Lowere; 7% with 15%.

These results are closely similar in magnitude and identical in trend as those for the Upper Level test. The disribution of disabilities by severity and age group are also consistent with the findings reported with the Upper Level test.

In 177 children 17% had a single perceptual disability, 10% had two perceptual disabilities, 6% had disabilities in the visual, auditory and motor modalities. The total occurrence is in good agreement with previously cited workers. The distribution of disabilities by modality again shows no bias to a specific modality in the test instrument. Visual: 24%. Auditory: 32%. Motor: 44%.

Disabilities were again found to occur proportionately higher in those of the lower socio-economic level. This finding has been discussed in the Upper level test validation.

Reliability of the Primary KLMT

Test - re-test reliability coefficient for the Primary KLMT was calculated as described previously. Reliability for disability diagnosis is .707, for modality preference measurement it is . 813. These values may be considered as indicating a high reliability for the Primary KLMT.

Administration of the Primary KLMT

A. Materials in the Primary KLMT are as follows:

1. Manual - one for each group to be tested
2. Test booklets - one for each child to be tested
3. Profile sheets - one for each child to be tested
4. Cassette or reel of tape as requested containing auditory tests

B. Equipment or materials to be supplied by tester are as follows:

1. No. 2 pencils - 2 for each child to be tested
2. Stop-watch
3. Tape player - good cassette or reel-to-reel type.

C. General instructions

1. Be informal; a relaxed, normal classroom situation is best.
2. Be ready to give additional examples for clarity, if needed, before testing starts. No help can be given after timing is begun.
3. Adhere rigidly to work time specifications. Use a stop-watch.
4. Specific instructions for each sub-test are found at the head of each test. Cursive or manuscript writing may be used.
5. Read all visual test instructions orally while students read silently.
6. Auditory tests:
   a. Read all auditory test instructions orally while students read silently.
   b. Start the tape when students are ready for the test. When the sub-test is ended, stop the tape and prepare for the next part.
7. Total test work time is about 15 minutes.

D. Scring - use same procedure as outlined for the Upper Level KLMT.

E. Profile sheets - see instructions given with Upper Level KLMT.

Description of Kindergarten KLMT

As in the Primary and Upper Level forms of the KLMT the test consists of exaggerated work sample items administered in brief time segments. In the Kindergarten form the visual portion contains no verbal materials, however. Thus all sub-tests of the visual modality are more purely perceptual measurements and do not rely on formal learning.

1. Visual
   A. Discrimination - students compare pairs of simple visual patterns. Draw line connecting members of each pair that are the same.
   B. Memory - Students study set of 5 simple patterns, then turn to set of 10 patterns and draw line through each item that appeared in the set of 5.
   C. Closure - Students compare 20 pairs of patterns, one member of each pair made of broken lines, one of complete lines. Draw line connecting members of pairs that are the same.
   D. Motor - Students draw lines between printed horizontal lines. Attempt to keep from touching the printed lines .
2. Auditory (on tape)
   A. Discrimination - Students draw line in numbered spaces for each pair of nonsense words that are the same.
   B. Memory - Students draw line in numbered spaces for each pair of word, letter, or numeral sets that are the same.
   C. Closure - Students draw line in numbered spaces for each syllable-nonsense word set in which the syllable is heard in the word.
   D. Motor - Students place marks in position and form on blank page as they are instructed.

Standardization of Kindergarten KLMT

The Kindergarten KLMT was standardized on the students of J. B. Watkins Elementary School. The test was administered in September, 1973 and again in April, 1974. The first administration and standardization was with 113 children between the ages of 5 and 6 years. In the April administration there were 106 childrenbetween the ages of 5 years, 6 months and 6 years 8 months. In this time there had been some change in the make-up of the population and a marked change in the maturational level of the population. The population statistics for both test periods will be presented below. The norms derived from both periods will be presented and the curves for both periods will be given. Thus there are norms for the Kindergarten KLMT for Kindergarten, first month and for Kindergarten, eighth month.

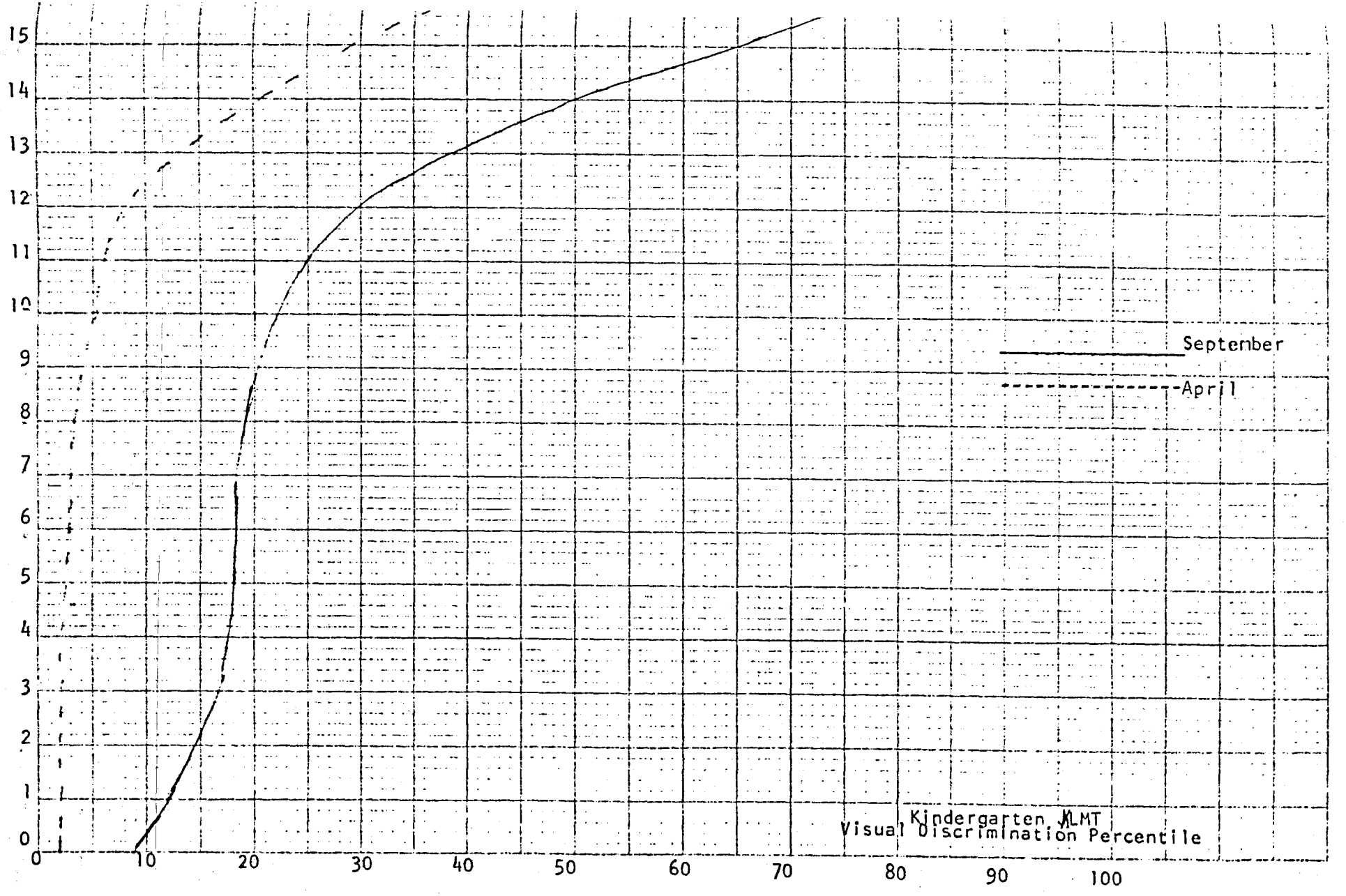
		Population		
		Watkins%		National %
Sex:	Male	52	52	49
	Female	48	47	51
Race:	White	95	98	89
	Black	5	2	10
	Other	0	0	1
Economic:	Upper	18	24	24
	Middle	77	73	60
	Lower	5	2	15
Geographic:	Rural	0	0	49
	Suburban	100	100	21
	Urban	0	0	30

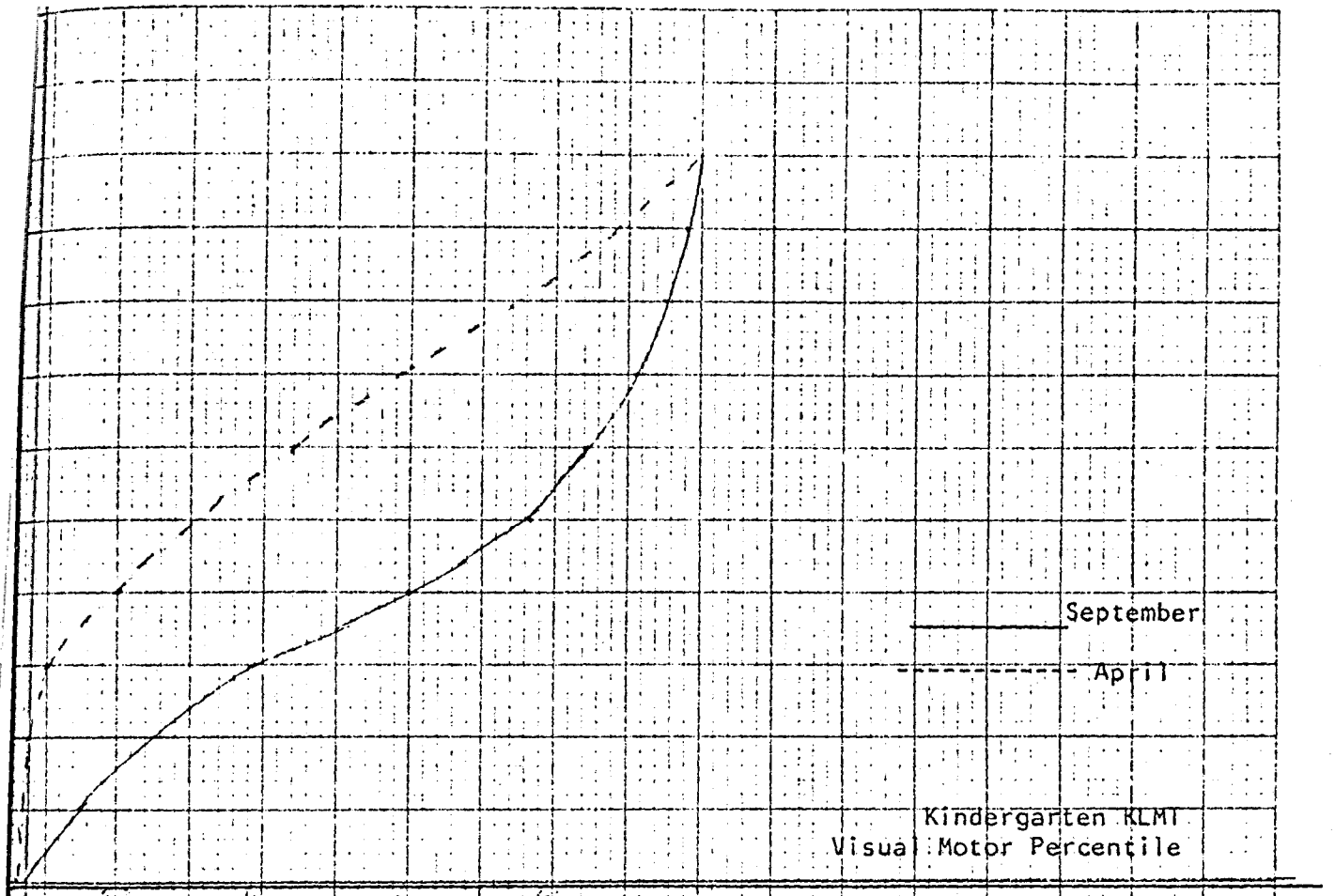
It may be seen that the test population composition has varied from one testing period to the other. However, the composition in the second period is not markedly more different from the national population than in the first period.

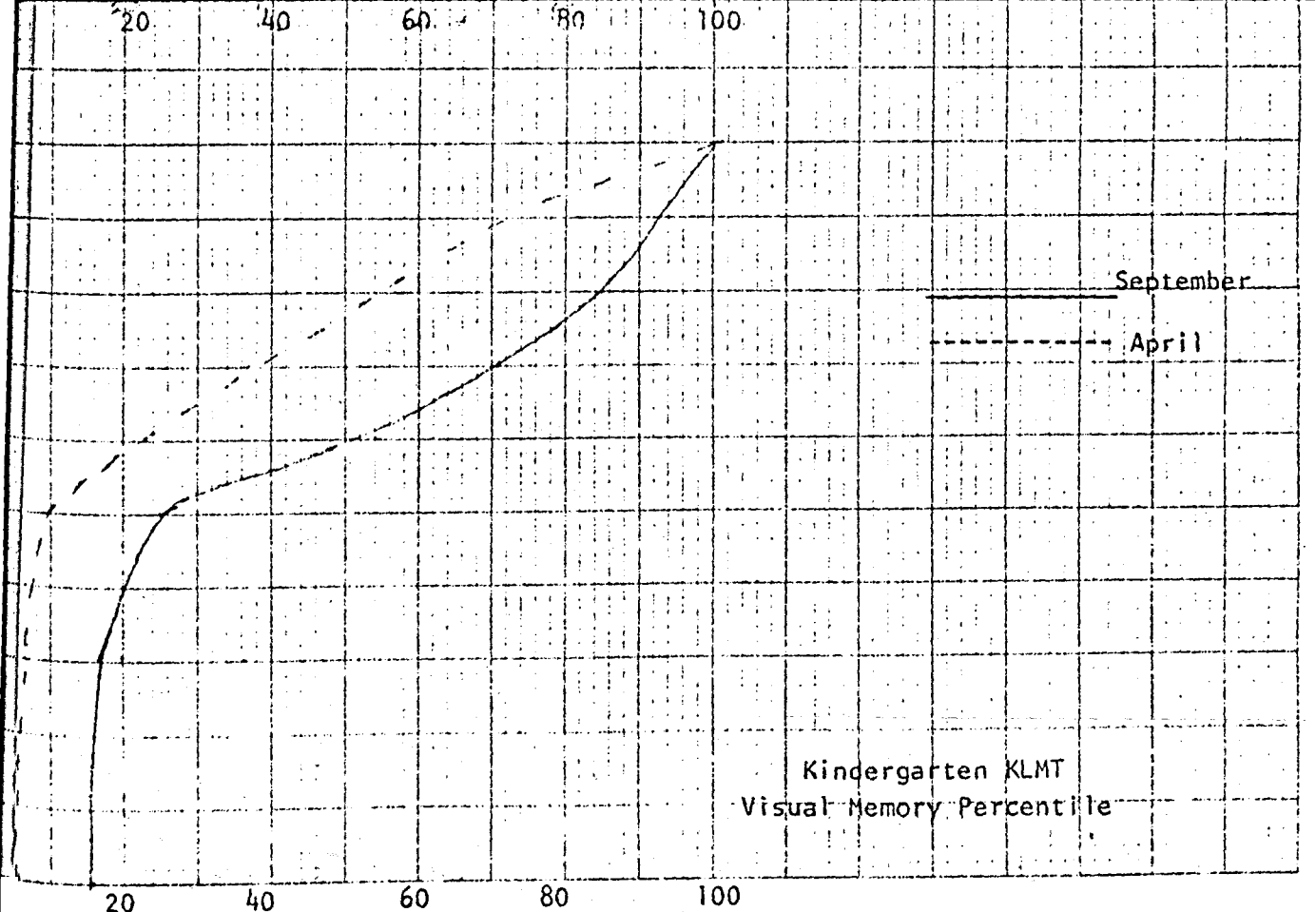
In both periods the Kindergarten KLMT was administered by a trained non-professional aide. The norms presented below were calculated by the standard method of grouping and deriving percentile from the cummulative frequency of scores.

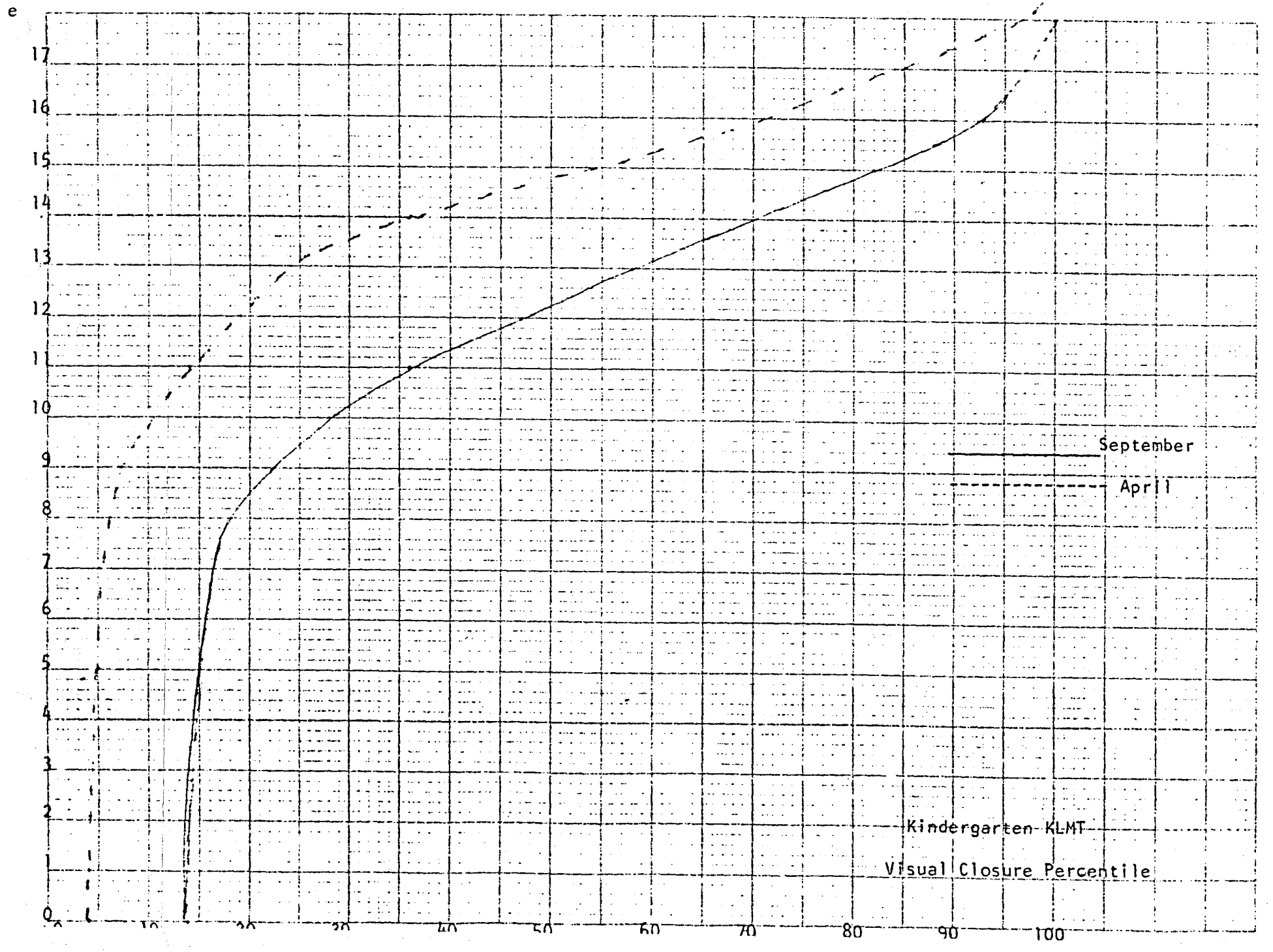
Kindergarten KLMT Norms

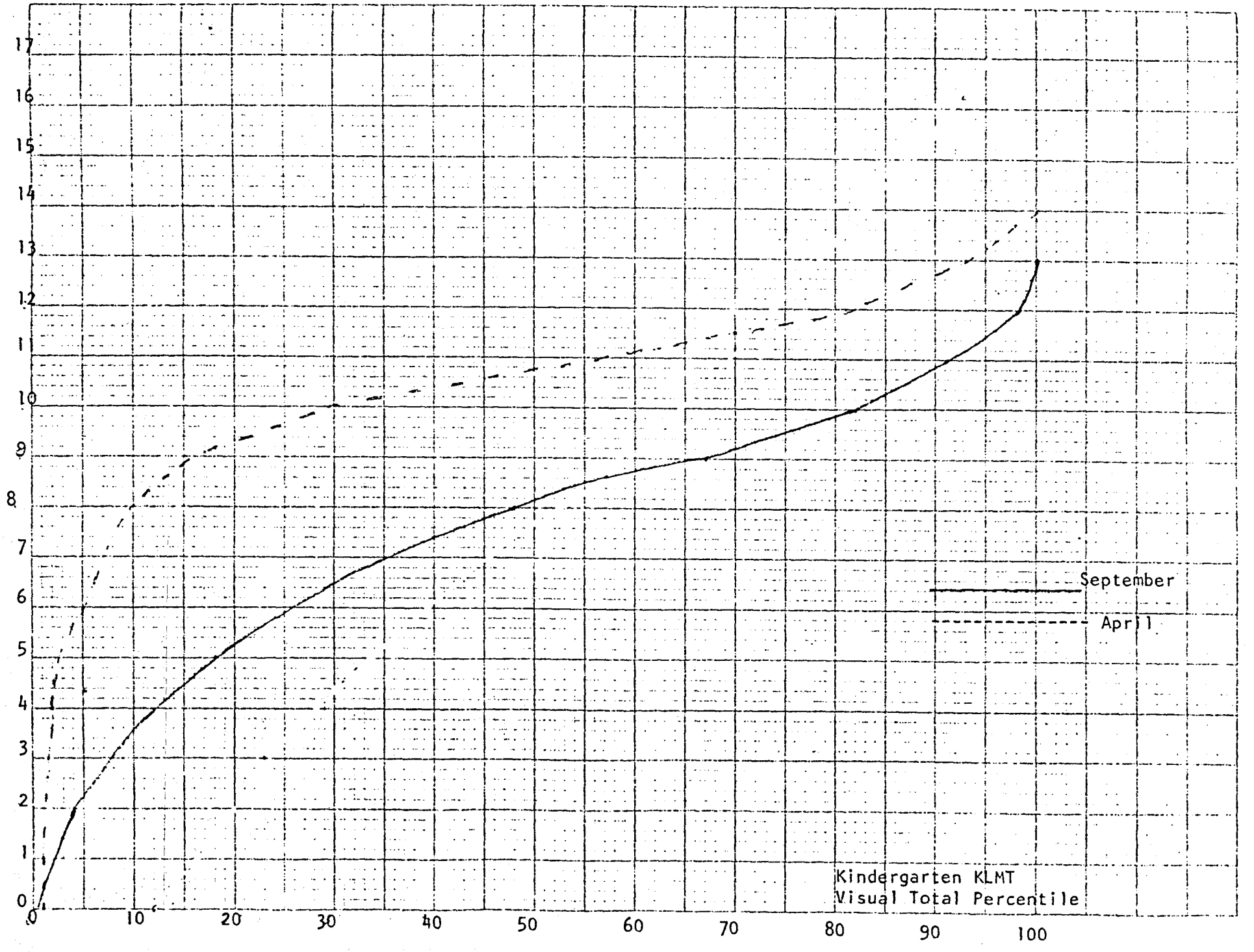
Score month	Visual Percentile										Auditory Percentile										Motor
	Disc.		Mem.		Clos.		Motor		Total		Disc.		Mem.		Clos.		Motor		Total		Total
	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1 8
0	9	2	15	5	14	4	7	5	1	1	19	5	30	6	27	5	14	4	19	5	10 4
1	12	2	16	5	14	4	15	6	3	1	20	5	31	7	29	6	21	5	21	5	17 5
2	15	2	16	5	14	4	25	7	4	1	22	6	33	8	31	8	26	8	24	6	25 8
3	17	2	17	6	14	4	39	10	9	2	24	6	38	9	33	9	32	14	28	9	36 12
4	18	2	20	6	15	5	60	20	12	2	33	8	50	11	38	10	40	19	36	12	52 19
5	18	3	26	9	15	5	76	37	18	2	44	10	64	20	48	16	48	25	49	18	65 31
6	18	3	50	22	16	5	84	44	27	5	60	15	80	33	64	35	58	31	64	29	74 37
7	18	3	70	37	16	5	91	59	35	7	77	34	90	56	78	59	71	41	78	47	82 50
8	19	3	85	53	18	6	95	75	48	9	90	68	96	82	89	77	82	58	88	71	90 66
9	20	4	92	68	22	7	98	86	67	15	100	99	100	99	99	97	97	71	96	92	94 78
10	22	5	100	100	28	11	100	100	82	29		100		100	100	100	100	100	100	100	100 100
11	25	6			36	14			91	57											
12	30	7			52	19			98	81	M 6.1	8.1	5.7	7.7	6.5	7.8	6.7	7.6	6.7	7.8	6.7 7.5
13	39	13			58	24			100	93	SD 1.4	1.3	1.5	1.3	1.6	1.3	1.5	1.4	1.4	1.3	1.5 1.4
14	50	20			70	36				100											
15	65	29			82	54															
16	77	36			93	71															
17	86	54			97	84															
18	95	75			100	97															
19	99	91				100															
M	13.5	16.0	7.2	8.7	12.9	15.3	6.6	7.5	9.9	11.9											

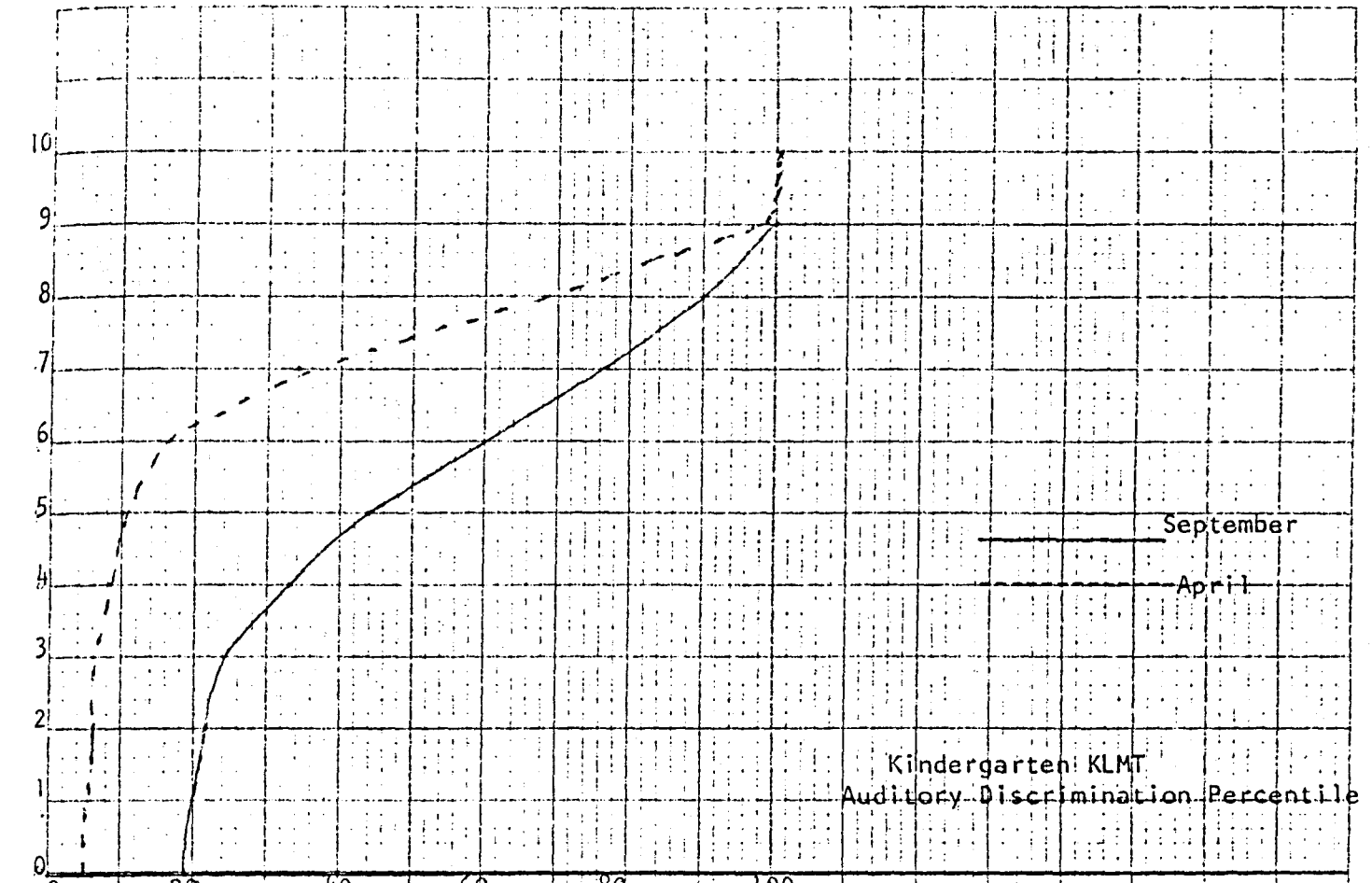

15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
September
April
Kindergarten MLMT
Visual Discrimination Percentile

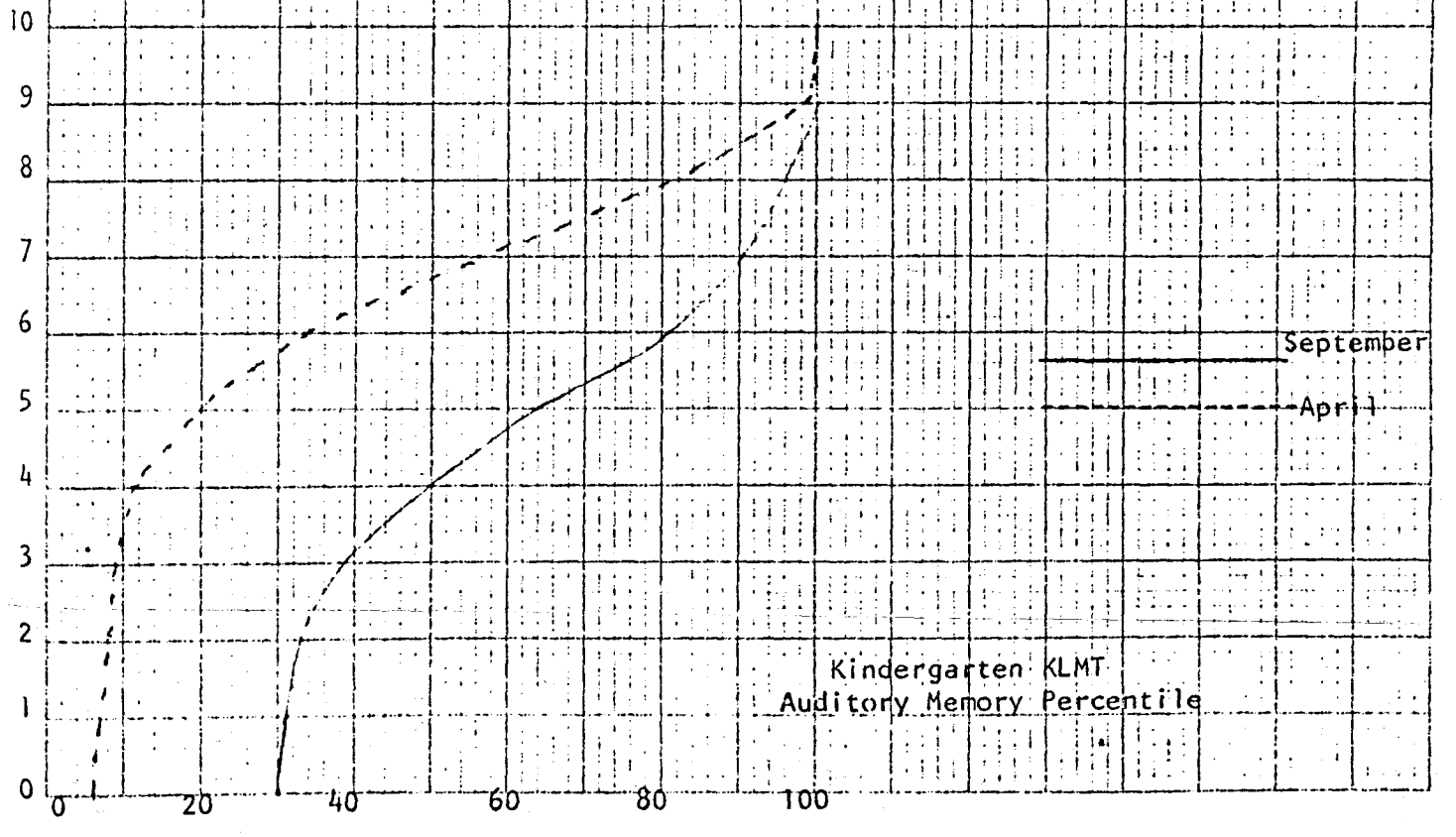

September
April
Kindergarten KLMT
Visual Motor Percentile
20
40
60
80
100

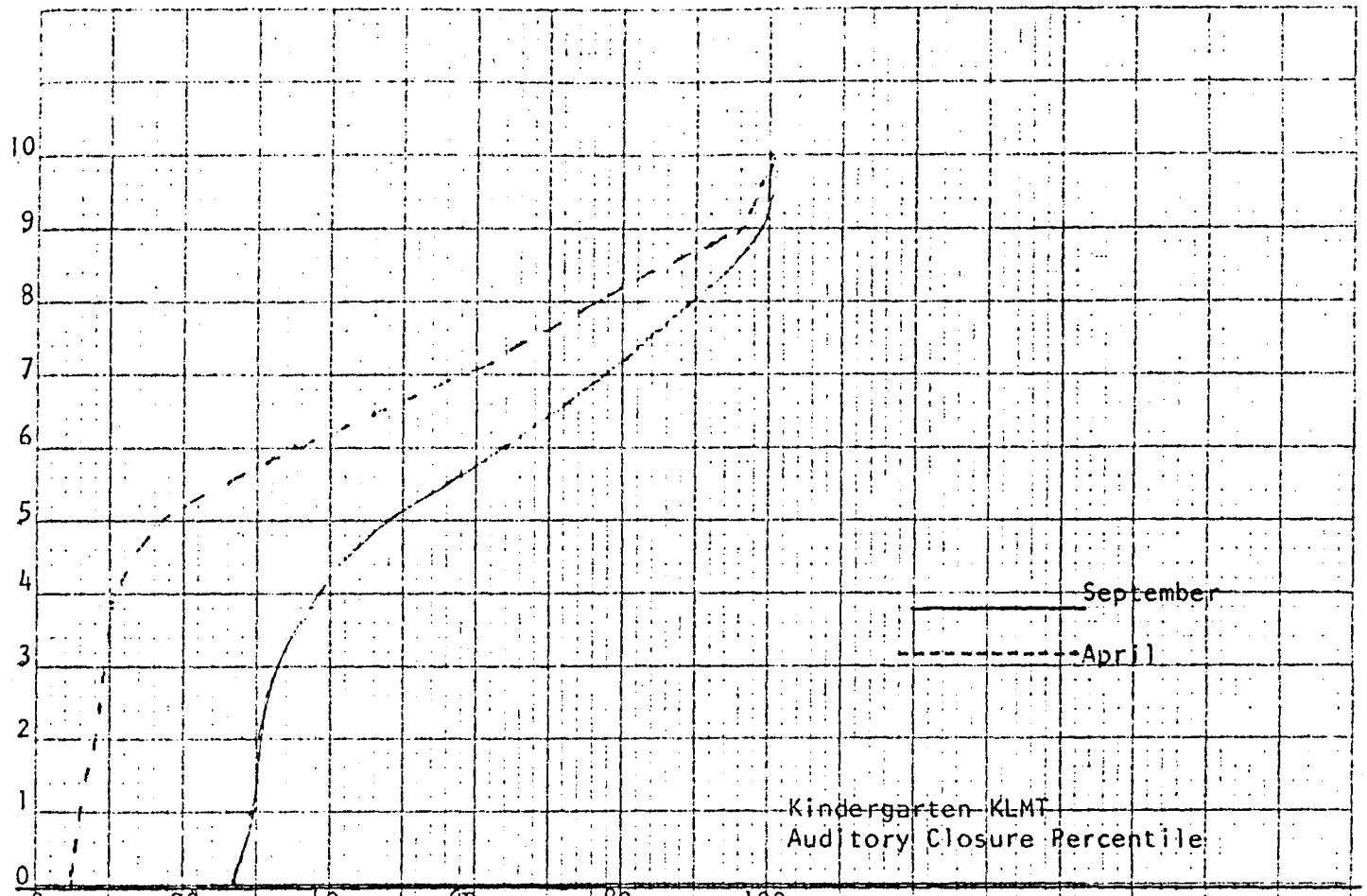

September
April
Kindergarten KLMT
Visual Memory Percentile
20
40
60
80
100

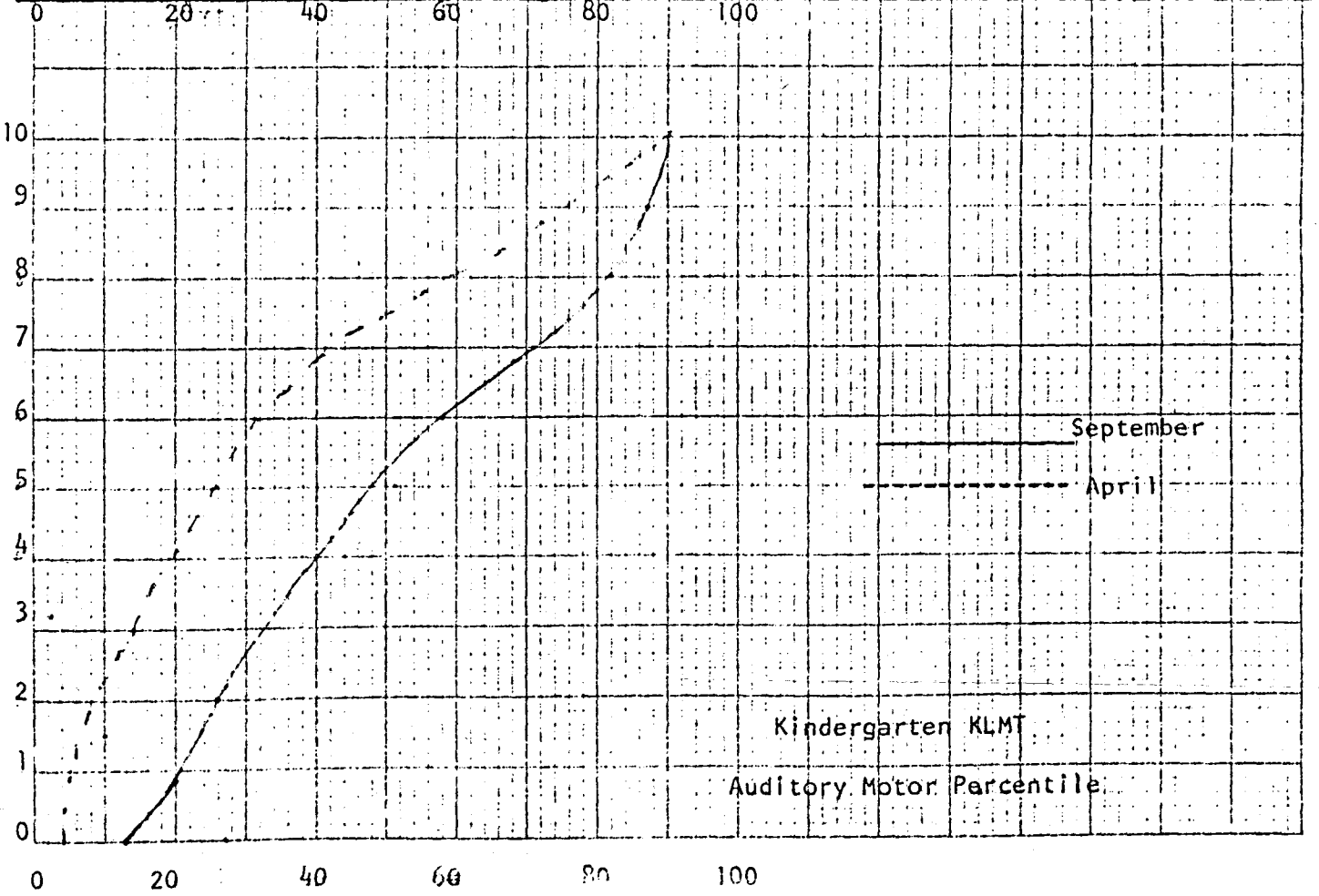

September
April
Kindergarten KLMT
Visual Closure Percentile

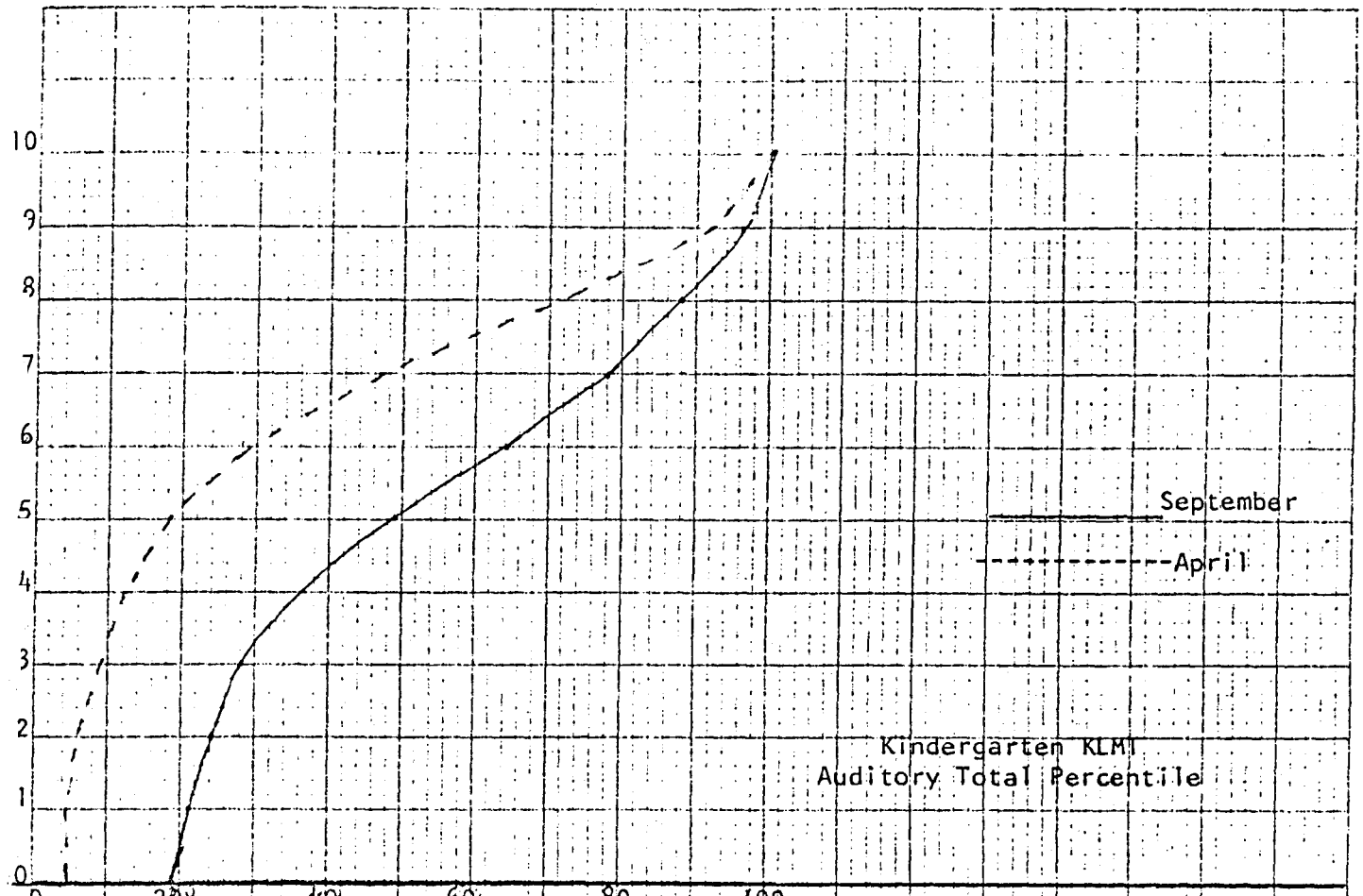

17
16
15
14
13
12
1
10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
September
April
Kindergarten KLMT
Visual Total Percentile

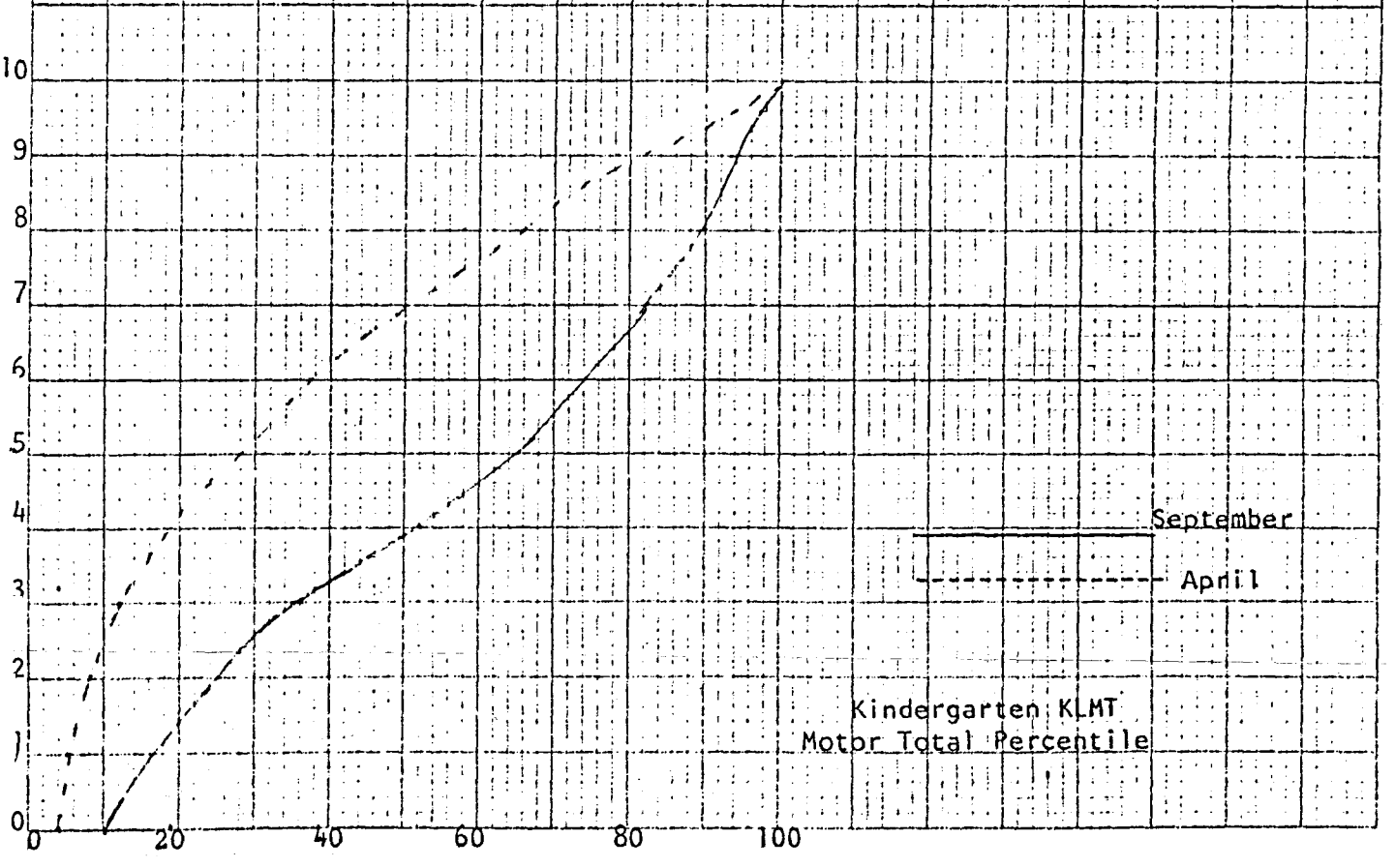

10
9
8
7
6
5
4
3
2
1
0
0
20
40
60
80
100
September
April
Kindergarten KLMT
Auditory Discrimination Percentile


10
9
8
7
6
5
4
3
2
1
0
0
20
40
60
80
100
September
April
Kindergarten KLMT
Auditory Memory Percentile


10
9
8
7
6
5
4
3
2
1
0
September
April
Kindergarten KLMT
Auditory Closure Percentile
0
20
40
60
80
100


10
9
8
7
6
5
4
3
2
1
0
September
April
Kindergarten KLMT
Auditory Motor Percentile
0
20
40
60
80
100


10
9
8
7
6
5
4
3
2
1
0
0
20
40
60
80
100
September
April
Kindergarten KLMT
Auditory Total Percentile


10
9
8
7
6
5
4
3
2
1
0
0
20
40
60
80
100
September
April
Kindergarten KLMT
Motor Total Percentile

Validation of the Kindergarten KLMT

Content Validation:

The sub-tests of the Kindergarten KLMT are based on the same concept of exaggerated work sample items given under conditions of standardized short time periods as in the Primary and Upper Level forms of the test.

Criteria Related Validation:

In the light of the high validation results found with the Primary and the Upper Level KLMT it was not necessary to make as intensive an analysis of criteria correlation with the Kindergarten test. The correlation of .990 in the visual and the auditory sub-tests and of .980 in the motor sub-tests with the Slingerland Screening Tests were sufficient to demonstrate that the Kindergarten KLMT has the same level of validity as exists for the Primary and the Upper Level KLMT.

Construct Validity:

The distribution of disabilities found with the Kindergarten KLMT is in good agreement with estimates of occurrence as found in writers cited in the discussion of the Primary and the Upper Level tests. The following table gives the distribution as found in the first month testing and in the eighth month testing.

	1st	8th
Single Disability	34%	10%
Two Disabilities	10%	9%
Three Disabilities	10%	2%

This finding of lower disability occurrence in the eighth month of the Kindergarten year demonstrates an earlier prediction of a rapid maturation of the perceptual modalities during this time period.This would suggest that when it is planned to test for perceptual modality function in the Kindergarten age it would result in more meaningful values if done in the spring rather than at the start of the year.

Distibution of disabilities by sex, race, and socio-economic background are similar to that found with the other forms of the KLMT. The greatest difference from the distribution found in the upper elementary ages is the evem distribution by sex in the Kindergarten. Again this is believed to reflect maturational rates and that the more common incidence at higher levels in boys will appear in the primary grades.

Reliability of the Kindergarten KLMT

The test - re-test reliability was determined useing the results of the September, 1973 administration of the test and the April, 1974 administration. The coefficient of reliability was .878, with a test - re-test population of 83. In this analysis it was found that 77% of the students test results were indicative of the same diagnosis as in the first test run. The maturational decrease in disability incidence is greater than the value needed to achieve 99% accuracy.

Statistical analyses were made in the same fashion as already described for the other forms of the KLMT.

Administration of the Kindergarten KLMT

A. Materials in Kindergarten KLMT are as follows:

1. Manual - one for each group to be tested
2. Test booklets - one for each student to be tested
3. Profile sheets - one for each student to be tested
4. Cassette tape or reel containing auditory tests

B. Equipment or materials to be supplied by tester are as follows:

1. Dark crayons - two for each student to be tested
2. Stop-watch
3. Tape player - good cassette or reel-to-reel type

C. General instructions

1. Be informal; a relaxed, normal classroom situation is best.
2. Adhere rigidly to work time specifications. Use a stop-watch.
3. Be ready to give additional examples for clarity if needed before testing starts. No help can be given after timing begins.
4. Specific instructions for each sub-test are found at the head of each test.
5. Read all test instructions orally. Be sure that instructions are understood by every student.
6. Auditory tests:
   a. Read all instructions orally.
   b. Start tape when every student is ready for the test. When the sub-test is ended, stop the tape and prepare for the next part.
7. Total test working time is about 10 minutes.
8. Total administration time is about 45 minutes.

D. Scoring:

1. Record total correct answers as on master form.
   a. Visual Discrimination - 20 total - use appropriate norm table for percentile.
   b. Visual Memory - 10 total - use norm table.

c. Visual Closure - 20 total - use norm table

d. Visual Motor - 10 total - use norm table

e. Visual Total - average the scores of sub-tests - percentile from norm table.

F. Auditory tests - 10 total in each sub-test- use norm tables as in visual tests.

E. Profile Sheets:

1. Complete as much of the data as possible.
2. Standardized Test Results - IQ scores
3. Specialist Data -psychologist, reading specialist, physician, etc.
4. Present Scholastic Standing - report card grades and/or standardized achievement test scores.
5. Observation - permanent record comments from teachers as to general and scholastic behavior.
6. Profile - use percentiles. keep modalities separated.

10. Recommendations - see interpretation.

Interpretation of KLMT Results

The KLMT is designed to indicate the existence of perceptual disabilities and perceptual preferences. Percentile scores below the twenty seventh are considered to be in the disability range. Scores between the twenty seventh and the fiftieth suggest some weakness but are within the normal functioning range. Scores above fifty suggest that no perceptual problem exists.

A low motor score should not be considered as a disability per se. The child with a low motor score may only have difficulty in completing written assignments and this is a matter that can easily be allowed for.

A low score in the total visual modality is to be considered a visual disability. While a visual disability seems to be a definite educational handicap, it does not seem to be a major problem.

A disability score in the auditory modality indicates a more severe problem. These children are frequently marked underachievers and need special attention.

A visual - motor disability is usually associated with scholastic difficulty particularly in the more rote skills. These children can frequently demonstrate adequate comprehension when given opportunities to express themselves orally.

The child with an auditory - motor disability seems to show erratic comprehension and poor mechanical performance. This child requires special attention.

The children with a auditory - visual or visual - auditory - motor disability seems to be the classic learning disability case. These children seem to require specially trained assistance.

A child with an auditory preference of ten or more points over the visual modality seems to be the one with fewest scholastic problems.

A child with a visual preference frequently has scholastic difficulties in comprehension.

A child whose profile shows no modality preference tends to have few scholastic problems.

Average and high modality scores do not mean that a child will have no scholastic difficulties but only that the difficulties are not caused by perception.

Some indication of the relative severity of disabilities may be seen in the following tabulation. Using the SRA standardize achievement tests, it was found that students with perceptual disabilities by KLMT measure had average scores several percentile points below the national average. This table is offered as suggestive but it supports the interpretation given above.

	Reading Comprehension	Math Concepts	Math Computation	Ave.
Motor disabilities	- 4 points	+ 2	- 7	- 3
Visual disabilities	-13	-22	-15	-17
Auditory disabilities	-27	-28	-17	-24
Visual/Motor	-28	-22	-32	-27
Auditory/Motor	-20	-44	-12	-25
Visual/Suditory/Motor	-37	-33	-30	-33

Early and consistent findings (Levy, 1973; Wender, 1971) are that simply understanding that the under achieving, often inattentive, hyperactive, impulsive, distractible and disruptive child is the victim of a perceptual disability rather than an undisciplined and wilful behavior problem produces a lessening of tension on the part of the teacher. This has a consequent beneficial effect on the rapport between the teacher and the child such that behavior and learning improve with no specific methodological changes.

References

Bannatyne, Alexander, Language, Reading and Learning Disabilities, Charles C. Thomas, 1971, Springfield, Ill.

Crocker, A. C., Statistics for the Teacher,Penguin Books, 1971, Baltimore

Crosby, R. M. N. and Robert A. Liston, "Dyslexia: What Yoy Can - and Can't Do About It", Grade Teacher, Teachers Publishing Co. 1969, Darien, Conn.

Cruikshank, W. M., The Brain-Injured Child in Home, School and Community, Syracuse Univ. Press, 1967, Syracuse

Frierson, Edward G. and Walter B. Barbe, Educating Children with Learning Disabilities,Meridith Publishing Co. 1967, N.Y.

Frostig, Marianne et al, The Marianne Frostig Developmental Test of Visual Perception,Consulting Psychologists Press, 1963, Palo Alto

Harris, Larry A. and Carl B. Smith, Individualizing Reading Instruction.Holt, Rinehart and Winston, 1972, N.Y.

Heilman, Arthur W. Principals and practices of Teaching Reading,Charles E. Merrill Publishing Co. 1967, Columbus, Ohio

Hurst, W. W. "A Basis for Diagnosing and Treating Learning Disabilities Within the School System", Journal of Learning Disabilities, 1968, Vol.1, No.4,pp.49-61

Johnson, Doris J. and H. R. Myklebust, Learning Disabilities,Grune and Stratton. 1967, N.Y.

Kaluger, George and C. J. Kolson, Reading and Learning Disabilities, Charles E. Merrill Publishing Co. 1969, Columbus, Ohio

Kass, Corrine E. "Learning Disability: an Educational Definition", Journal of Learning Disabilities,1969, Vol. 2, no. 7, pp. 377-379

Levy, Harold B. MD. Square Pegs and Round Holes, Little, Brown and Co. 1973, Boston

Long, Luman H.ed. The World Almanac, Newspaper Enterprises Assoc. 1971, N.Y.

Meier, John H. "Prevalence and Characteristics of Learning Disabilities Found in Second Grade Children", Journal of Learning Disabilities, 1971, Vol. 4 No. 1, pp8-14

Myklebust, H. R. Progress in Learning Disabilities, Grune and Stratton, 1968,N.Y.

Oakland, Thomas D. "Auditory Discrimination and Socio-economic Status as Correlates of Reading Ability", Journal of Learning Disabilities, 1969, Vol. 2, No. 6, pp. 325-327

Oakland, Thomas D. and Fern C. Williams, Auditory Perception, Special Child Publications, 1971, Seattle

Schini, Mary Ann, "Perceptual Problems", Grade Teacher, 1970, Teachers Publishing Co. Vol. 87, no. 8, Darien, Conn.

Siegel, Ernest, Special Education in the Regular Classroom, John Day Co. 1969,N.Y.

Silver, Larry B. "The Neurological Learning Disability Syndrome and its Definition", Journal of Learning Disabilities, 1971, Vol. 4, No. 7, pp. 349-358

Slingerland, Beth A., A Screening Test for Identifying Children with Specific Language Disability, Educators Publishing Service, 1962, Cambridge, Mass.

Valett, R. E. A Psychoeducational inventory of Basic Learning Abilities, Fearon Publishers, 1968, Palo Alto

Wender, Paul H. MD. Minimal Brain Dysfunction in Children, John Wiley and Sons, 1971, N.Y.

Wepman, J. Auditory Discrimination Test, Language Research Associates, 1958, Chicago

APPENDIX II

MT: School_____ Grade_____ Date_____
Yr. Mo.

Name_____ Sex____ Race_____ Age_____ Background_____
Yr. Mo.

. Standardized Test Results:

Test_____ Date_____ Scores_____ Test_____ Date_____ Scores___

I. Specialist Data:

Specialist_____ Date_____ Comments_____ _____

Specialist_____ Date_____ Comments_____

. Present Scholastic Standing:

Reading_____ Spelling_____ Writing_____ Math_____ Other_____

Observation:

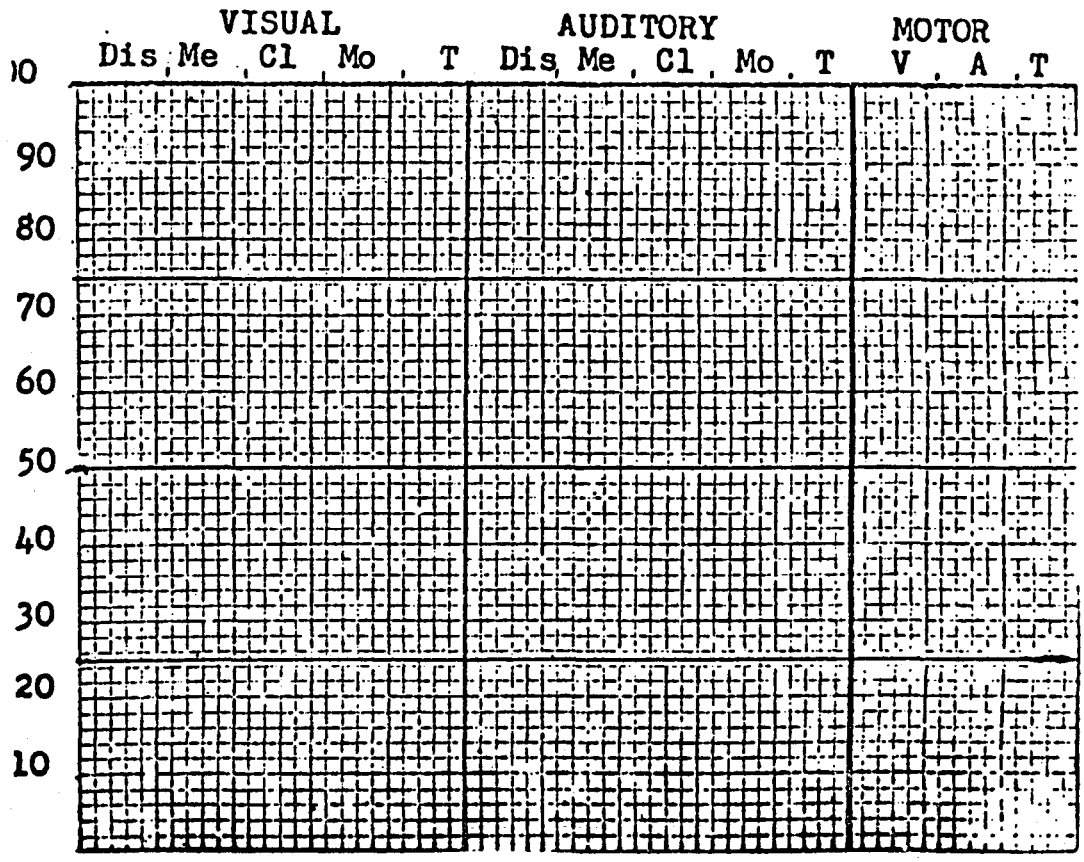
Teacher_____ Remarks_____ Date_____

Teacher_____ Remarks_____ Date_____

isual	Score	Pctle.
isc.	____	____
em.	____	____
los.	____	____
ot.	____	____
ot.	____	____

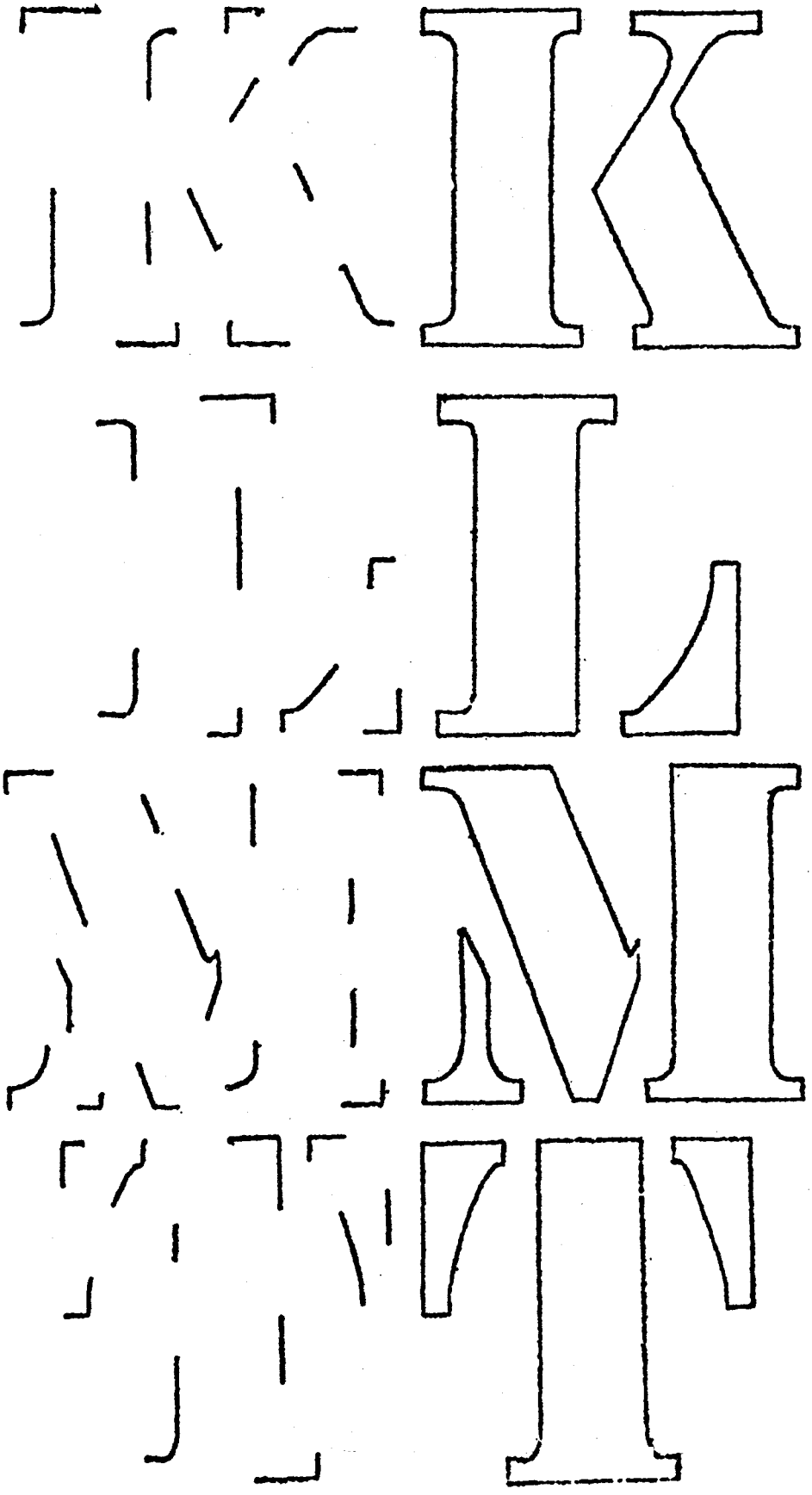
udit.	Score	Pctle.
isc.	____	____
em.	____	____
los.	____	____
ot.	____	____
ot.	____	____

otor	Score	Pctle.
is.	____	____
ud.	____	____
ot.	____	____



RECOMMENDATIONS:

APPENDIX III



KERBY LEARNING MODALITY TEST - PRIMARY

VISUAL DISCRIMINATION

In this test you will have pairs of number and letter groups. Look at both parts of each pair. If they are the same, draw a dark line through the S. If they are different, draw a dark line through the D.

Example:

A. 7248 7428 S D

B. XWVU XWVU S D

In example A both parts of the pair are not the same. They are different. You draw a dark line through the D. In example B both parts of the pair are the same. You draw a dark line through the S.

Mark your answer in the column right beside each test pair. When you finish the first ten turn the page and continue until you have answered all the test pairs or time is called. You have two minutes for this test. Work quickly but be careful. At the signal you may begin work.

VISUAL DISCRIMINATION

1.	BVEJMD	BVOJMD	S	D
2.	BRJNF	BFRJNF	S	D
3.	9527	9627	S	D
4.	FWECK	FWECH	S	D
5.	3793	3793	S	D
6.	2647	2647	S	D
7.	IMQUY	IWQUY	S	D
8.	NRMUS	NRMUS	S	D
9.	3563	3263	S	D
10.	ODBNUM	OBDNUM	S	D

11.	29368	23968	S	D
12.	DBGQP	DDGPQ	S	D
13.	46853	48653	S	D
14.	NURIVI	NURIVE	S	D
15.	46853	46835	S	D
16.	LIJWV	LIJWV	S	D
17.	57324	53724	S	D
18.	73646	73646	S	D
19.	OUIWMN	OUIWMM	S	D
20.	78524	78324	S	D

Visual Discrimination

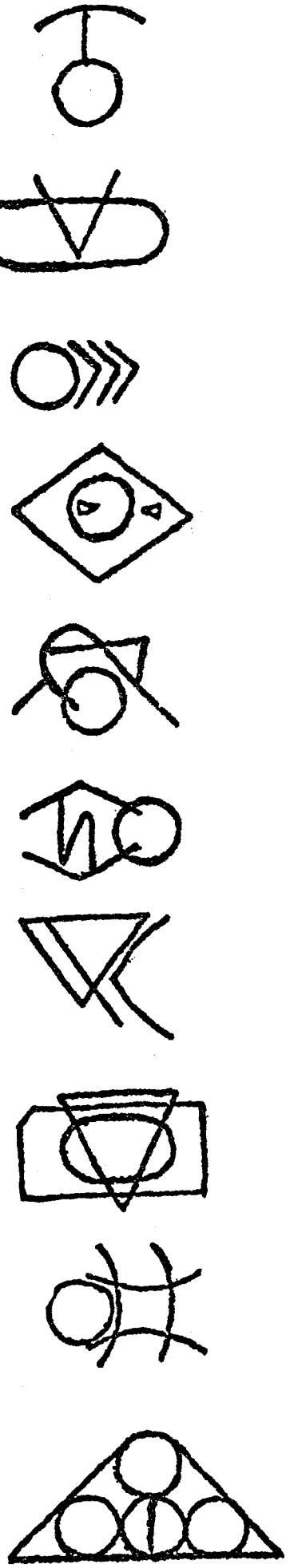
SCORE._____

VISUAL MEMORY

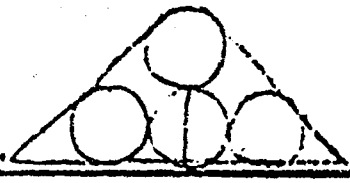
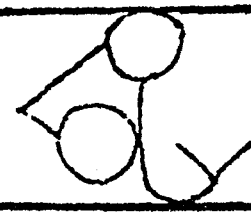
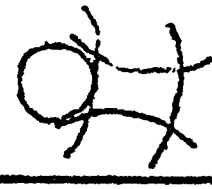
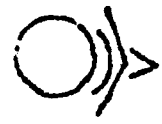
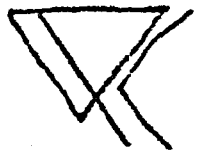
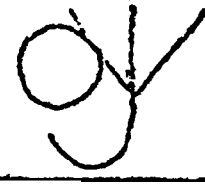
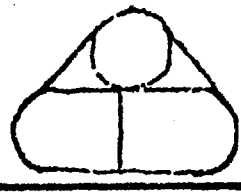
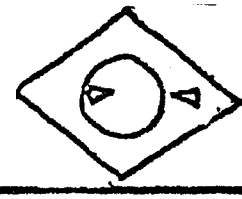
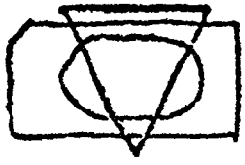
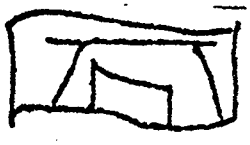
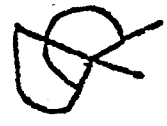
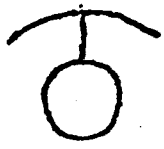
In this test you will have 30 seconds to study a set of figures. At the end of that time you will be told to turn the page to a larger set of figures. You will look at each figure and draw a line through the S if it is the same as one you had studied. You will draw a line through the D if it is different from any you had studied. Mark your answers in the column right beside the test figures.

When you come to the end of the page, STOP. You have two minutes for this test. Work quickly but be careful.

At the first signal turn to the memory study page and begin studying them. You will have 30 seconds. At the second signal turn the study page under. At the third signal you may begin work. Draw a dark line through the S if the test figure is the same as one you studied. Draw a dark line through the D if it is different.



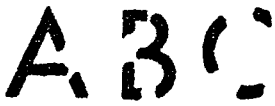
VISUAL MEMORY TEST

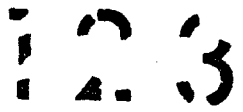
1. 	S D	11. 	S D
2. 	S D	12. 	S D
3. 	S D	13. 	S D
4. 	S D	14. 	S D
5. 	S D	15. 	S D
6. 	S D	16. 	S D
7. 	S D	17. 	S D
8. 	S D	18. 	S D
9. 	S D	19. 	S D
10. 	S D	20. 	S D

 Visual Memory SCORE._____

VISUAL CLOSURE

In this test you will have broken letters and numerals. Write the letters or numerals that you see in the spaces beside each group.

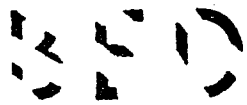
Example: A.  A._____

B.  B._____

In example A you see the letters A B C and so you write A B C. In example B you see the numerals 1 2 3 and so you write 1 2 3.

You have 3 minutes for this test. Work quickly but be careful. When you reach the bottom of the first page turn to the next and continue to work until you have finished or time is called. At the signal you may begin work.

VISUAL CLOSURE

1. 

1. _____

2. 

2. _____

3. 

3. _____

4. 

4. _____

5. 

5. _____

6. 

6. _____

7. 

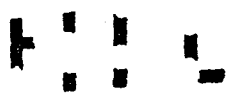
7. _____

8. 

8. _____

9. 

9. _____

10. 

10. _____

11. 

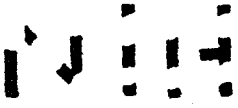
12. 

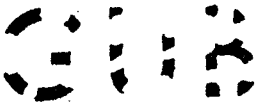
13. 

14. 

15. 

16. 

17. 

18. 

19. 

20. 

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

Visual Closure

9 SCORE._____

VISUAL MOTOR

In this test you will have a list of numbers and nonsense words. You will copy as many as you can. Write in the spaces beside the list. When you reach the bottom of the first page continue on the next until you have copied all the words and numbers or time is called.

You have two minutes for this test. Work quickly but be careful. At the signal you may begin work.

VISUAL MOTOR

1. 475	1.
2. 728	2.
3. STUM	3.
4. 405	4.
5. CL DO	5.
6. BISCI	6.
7. 436	7.
8. ANMOR	8.
9. 707	9.
10. 4376	10.

11. 0142	11. _____
12. REWVA	12. _____
13. NURMB	13. _____
14. 4296	14. _____
15. EL PUEL	15. _____
16. ECLER	16. _____
17. 9103	17. _____
18. 0264	18. _____
19. ANWANE	19. _____
20. TUMNIF	20. _____

Visual Motor

SCORE. _____

AUDITORY DISCRIMINATION (Part I)

In this test you will hear pairs of nonsense words. If the pair rhymes, draw a dark line through the S. If the pair does not rhyme, draw a dark line through the D.

Example:	A.	GRESS	FLESS	S	D
	B.	GRESS	FLEST	S	D

In example A the pair rhymes. You draw a dark line through the S. In example B the pair does not rhyme. You draw a dark line through the D.

Listen carefully. These words will be called only once.

1.	S	D
2.	S	D
3.	S	D
4.	S	D
5.	S	D
6.	S	D
7.	S	D
8.	S	D
9.	S	D
10.	S	D

AUDITORY DISCRIMINATION (Part II)

In this test you will hear pairs of nonsense words. Listen to both parts of each pair. If the first vowel sounds are the same, draw a dark line through the S. If they are different, draw a dark line through the D.

Example:	A.	MAFFER	FANNER	S	D
	B.	GRESSING	GISHING	S	D

In example A the first vowel sounds are the same. You draw a dark line through the S. In example B the first vowel sounds are different, you draw a dark line through the D.

Listen carefully. These words will be called only once.

1.	S	D
2.	S	D
3.	S	D
4.	S	D
5.	S	D
6.	S	D
7.	S	D
8.	S	D
9.	S	D
10.	S	D

SCORE_____

AUDITORY MEMORY

In this test you will hear pairs of number and letter sets. Write a plus (+) a minus (-) to show if something was added or left out and write the number or tter added or left out in the second part of each pair.

Example:	A. 5 2 6 7	2 6 7	_____
	B. Z Y W	Z Y X W	_____

In example A the numeral 5 was left out of the second part of the pair so you ite - 5. In example B the letter X was added to the second part of the pair so you ite + X.

Listen carefully. These pairs will be called only once.

---

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

SCORE_____

AUDITORY CLOSURE (Part I)

In this test you will hear pairs of nonsense words. The first word of each ir will be broken into its parts. The second word will be given whole. If the oken word and the whole word are the same, draw a dark line through the S. If they e different, draw a dark line through the D.

Example:	A. F L E T	FLET	S	D
	B. S T O G	STUG	S	D

In example A the broken word and the whole word are the same word so you draw dark line through the S. In example B they are different so you draw a dark line rough the D.

Listen carefully. These words will be called only once.

1.	S	D
2.	S	D
3.	S	D
4.	S	D
5.	S	D
6.	S	D
7.	S	D
8.	S	D
9.	S	D
10.	S	D

AUDITORY CLOSURE (Part II)

In this test you will hear pairs of nonsense words. The first word of each pair will have a sound left out. The second word will have a sound added to make a complete word. If the complete word is the same as the first with just a sound added, draw a dark line through the S. If the sounds of the first word have been changed not just added to, the words are different and you draw a dark line through the D.

Example:	A.	matterone	mattertone	S	D
	B.	atterbone	fatterbone	S	D
	C.	attertone	cottertin	S	D

In examples A and B a sound has simply been added to the first word and so you draw a dark line through the S. In example C a sound has been added and the first word itself has been changed so you draw a dark line through the D.

Listen carefully. These words will be called only once.

1.	S	D
2.	S	D
3.	S	D
4.	S	D
5.	S	D
6.	S	D
7.	S	D
8.	S	D
9.	S	D
10.	S	D

SCORE_____

AUDITORY MOTOR

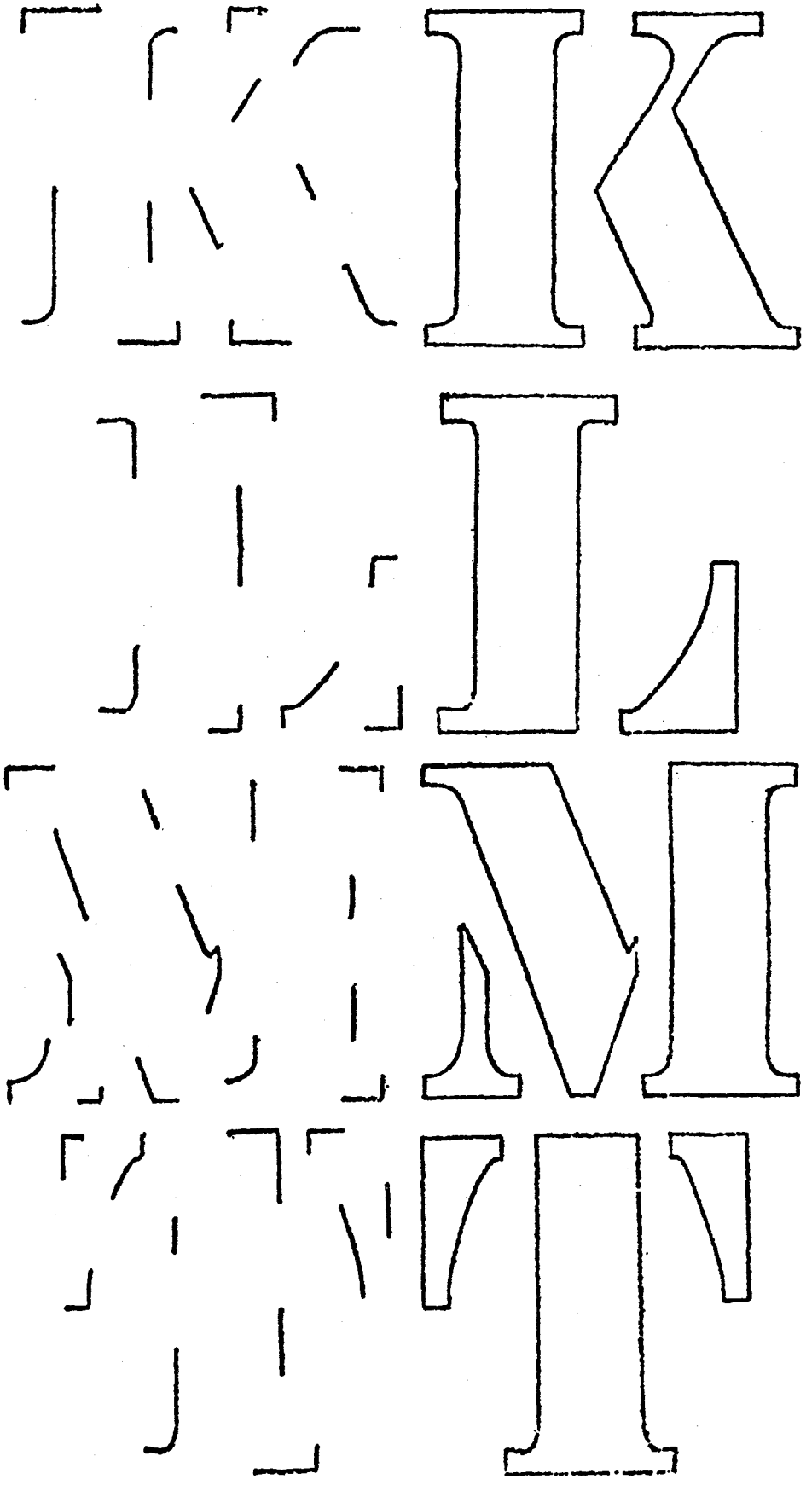
In this test you are to write each numeral or letter as you hear it. Put one numeral or one letter on each line. If you lose your place, start writing again with the next letter or numeral that you hear.

Listen carefully. This list will be called only once.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

SCORE_____

APPENDIX IV



KERBY LEARNING MODALITY TEST - INTERMEDIATE

VISUAL DISCRIMINATION

(Column 1 Answer Sheet ONE)

In this test you will have pairs of number and letter groups. Look at both parts of each pair. If they are the same draw a dark line through the S. If they are different draw a dark line through the D.

Example:	A.	3 5 7 2 4 8	3 5 7 4 2 8
	B.	Z Y X W V U	Z Y X W V U

In example A both parts of the pair are not the same. They are different. You draw a dark line through the D. In example B both parts of the pair are the same. You draw a dark line through the S.

Use column 1 of answer sheet ONE. When you come to the end of the page or when time is called STOP. You have one minute for this test. Work quickly but be careful. At the signal you may begin work.

VISUAL DISCRIMINATION

1.	gibvejmd	gibvojmd
2.	brjnfvz	bfrjnfvz
3.	409527	409627
4.	oufweck	oufwech
5.	253793	253793
6.	742647	742647
7.	aeimquy	aeiwquy
8.	ainrmus	ainrmus
9.	873565	873265
10.	elodbnum	elobdnum
11.	5429368	5423968
12.	dbgqpfy	ddgpqfy
13.	1946853	1948653
14.	kmnurivi	kmnurive
15.	9246853	9246835
16.	yvlijwv	yvlijwv
17.	6857324	6853724
18.	1973646	1973646
19.	eaouiwmn	eaouiwmm
20.	3078524	3078324

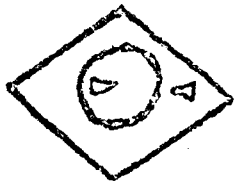
VISUAL MEMORY

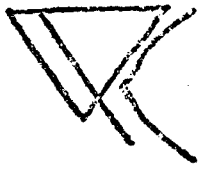
(Column 2 Answer Sheet ONE)

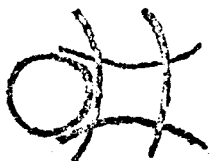
In this test you will have 15 seconds to study a set of figures. At the end of that time you will be told to turn the page to a larger set of figures. Look at each figure. Draw a dark line through the S if it is the same as one you studied. Draw a dark line through the D if it is different from ones you studied. You may not look back.

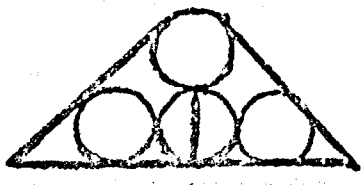
Use column 2 of answer sheet ONE. When you come to the end of the page or when time is called STOP. You have one minute for this test. Work quickly but be careful.

At the first signal turn to memory study page and begin studying the figures. You will have 15 seconds, at the second signal turn the study page under. At the third signal you may begin work.

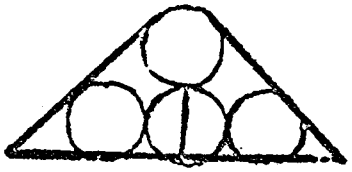








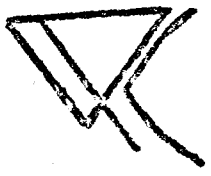
VISUAL MEMORY TEST

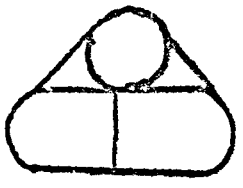
1. 

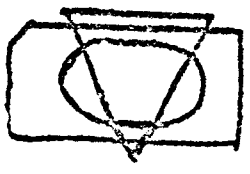
2. 

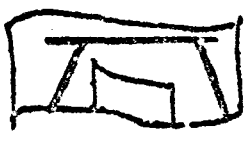
3. 

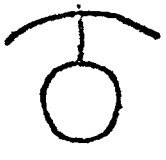
4. 

5. 

6. 

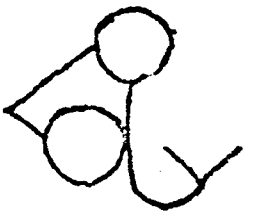
7. 

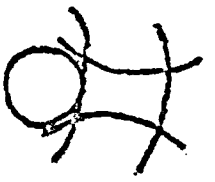
8. 

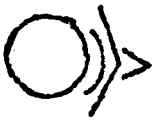
9. 

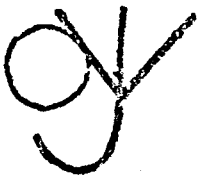
10. 

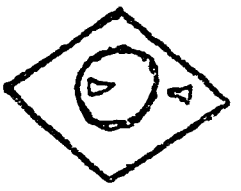
11. 

12. 

13. 

14. 

15. 

16. 

17. 

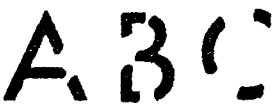
18. 

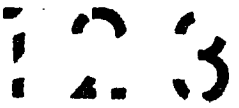
19. 

VISUAL CLOSURE

(Column 3 Answer Sheet ONE)

In this test you will have broken letters and numerals. Write the letters or numerals that you see.

Example: A. 

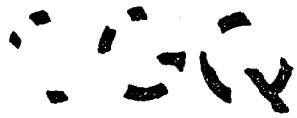
B. 

In example A you see the letters A B C and so you write A B C. In example B you see the numerals 1 2 3 and so you write 1 2 3.

Use column 3 of answer sheet ONE. When you come to the end of the page or when time is called STOP. You have one minute for this test. Work quickly but be careful. At the signal you may begin work.

VISUAL CLOSURE

1. 

2. 

3. 

4. 

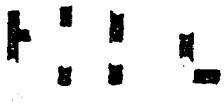
5. 

6. 

7. 

8. 

9. 

10. 

11. 

12. 

13. 

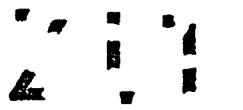
14. 

15. 

16. 

17. 

18. 

19. 

20. 

VISUAL MOTOR

(Column 4 Answer Sheet ONE)

In this test you will have a list of numbers and nonsense words. You will copy as many as you can.

Use column 4 of answer sheet ONE. When you come to the end of the page or when time is called STOP. You have one minute for this test. Work quickly but be careful. At the signal you may begin work.

VISUAL MOTOR

1. 38475
2. 61728
3. tostum
4. 30405
5. boldot
6. bisdism
7. 21436
8. granmor
9. 58707
10. 214376
11. 980142
12. rewvalt
13. nurmble
14. 754296
15. quelpuel
16. gledler
17. 829103
18. 730624
19. vanwaner
20. tumniful

AUDITORY DISCRIMINATION (PART I)

(Top Group Column 1 Answer Sheet TWO)

In this test you will hear pairs of nonsense words. If the pair rhymes, draw a dark line through the S. If the pair does not rhyme, draw a dark line through the D.

Example:	A.	GRESS	FLESS
	B.	GRESS	FLEST

In Example A the pair rhymes. You draw a dark line through the S. In example B the pair does not rhyme. You draw a dark line through the D.

Use the top group on column 1 of answer sheet TWO. Listen carefully. These words will be called only once.

AUDITORY DISCRIMINATION (PART II)

(Bottom Group Column 1 Answer Sheet TWO)

In this test you will hear pairs of nonsense words. Listen to both parts of each pair. If the first vowel sounds are the same, draw a dark line through the S. If they are different, draw a dark line through the D.

Example:	A.	MAFFER	FANNER
	B.	GRESSING	GISHING

In example A the first vowel sounds are the same. You draw a dark line through the S. In example B the first vowel sounds are different. You draw a dark line through the D.

Use the bottom group on column 1 of answer sheet TWO. Listen carefully. These words will be called only once.

AUDITORY MEMORY

(Column 2 Answer Sheet TWO)

In this test you will hear pairs of number and letter sets. Write a plus (+) or a minus (-) to show if something was added or left out and write the number or letter added or left out in the second part of each pair.

Example:	A.	5 2 6 7 8	2 6 7 8
	B.	Z Y W V U	Z Y X W V U

In example A the numeral 5 was left out of the second part of the pair so you write - 5. In example B the letter X was added to the second part of the pair so you write + X.

Use column 2 of answer sheet TWO. Listen carfully. These pairs will be called only once.

AUDITORY CLOSURE (PART I)

(Top Group Column 3 Answer Sheet TWO)

In this test you will hear pairs of nonsense words. The first word of each pair will be broken into its parts. The second word will be given whole. If the broken word and the whole word are the same, draw a dark line through the S. If they are different, draw a dark line through the D.

Example:	A. F L E T	FLET
	B. S T O G	STUG

In example A the broken word and the whole word are the same word so you draw a dark line through the S. In example B they are different so you draw a dark line through the D.

Use the top group on column 3 answer sheet TWO. Listen carefully. These words will be called only once.

AUDITORY CLOSURE (PART II)

(Bottom Group Column 3 Answer Sheet TWO)

In this test you will hear pairs of nonsense words. The first word of each pair will have sounds left out. The second word will have sounds added to make a complete word. If the complete word is the same as the first with just sounds added draw a dark line through the S. If the sounds of the first word have been changed, not just added to, the words are different and you draw a dark line through the D.

Example:	A.	ATTER ANE	FATTERBANE
	B.	ATTER ANE	COTTERLINE

In example A sounds have simply been added to the first word and so you draw a dark line through the S. In example B sounds have been added and the first word itself has been changed so you draw a dark line through the D.

Use the bottom group on column 3 answer sheet TWO. Listen carefully. These words will be called only once.

AUDITORY MOTOR

(Column 4 Answer Sheet TWO)

In this test you are to write each numeral or letter as you hear it. Put one numeral or one letter on each line. If you lose your place, start writing again with the next letter or numeral that you hear.

Use column 4 of answer sheet TWO. Listen carefully. This list will be called only once.

APPENDIX V

KLMT: VISUAL

NAME_____

ANSWER SHEET ONE

Discrimination	Memory	Closure	Motor
1	2	3	4
Example:		Example:	
A. S D		A._____	
B. S D		B._____	
1. S D	1. S D	1._____	1._____
2. S D	2. S D	2._____	2._____
3. S D	3. S D	3._____	3._____
4. S D	4. S D	4._____	4._____
5. S D	5. S D	5._____	5._____
6. S D	6. S D	6._____	6._____
7. S D	7. S D	7._____	7._____
8. S D	8. S D	8._____	8._____
9. S D	9. S D	9._____	9._____
10. S D	10. S D	10._____	10._____
11. S D	11. S D	11._____	11._____
12. S D	12. S D	12._____	12._____
13. S D	13. S D	13._____	13._____
14. S D	14. S D	14._____	14._____
15. S D	15. S D	15._____	15._____
16. S D	16. S D	16._____	16._____
17. S D	17. S D	17._____	17._____
18. S D	18. S D	18._____	18._____
19. S D	19. S D	19._____	19._____
20. S D	20. S D	20._____	20._____
Vis. Disc._____	Vis. Mem._____	Vis. Clo._____	Vis. Mot._____

KLMT: AUDITORY

NAME_____

ANSWER SHEET TWO

Discrimination 1	Memory 2	Closure 3	Motor 4
Example:	Example:	Example:	
A. S D	A._____	A. S D	
B. S D	B._____	B. S D	
1. S D	1._____	1. S D	_____
2. S D	2._____	2. S D	_____
3. S D	3._____	3. S D	_____
4. S D	4._____	4. S D	_____
5. S D	5._____	5. S D	_____
6. S D	6._____	6. S D	_____
7. S D	7._____	7. S D	_____
8. S D	8._____	8. S D	_____
9. S D	9._____	9. S D	_____
10. S D	10._____	10. S D	_____
Example:		Example:	_____
A. S D		A. S D	_____
B. S D		B. S D	_____
1. S D		1. S D	_____
2. S D		2. S D	_____
3. S D		3. S D	_____
4. S D		4. S D	_____
5. S D		5. S D	_____
6. S D		6. S D	_____
7. S D		7. S D	_____
8. S D		8. S D	
9. S D		9. S D	
10. S D		10. S D	
Aud. Disc._____	Aud. Mem._____	Aud. Clo._____	Aud. Mot._____

VITA

Thomas Spencer Chalkley, Jr. was born on October 28, 1947, in Richmond, Virginia. Upon graduation from high school in 1966, he entered Randolph-Macon College, Ashland, Virginia. He was awarded the BA in Psychology in June, 1970. Before entering the University of Richmond in September, 1972 to begin work on the degree of Master of Arts in psychology, he taught special education in Chesterfield County Public Schools, Virginia. He expects to be awarded the MA degree in May, 1976.